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A FEW PERTINENT AND IMPERTINENT SUGGESTIONS IN BEHALF OF THE COMMUTER.

BY AN OLD RAILROADER.

[Written for the AMERICAN RAILROAD JOURNAL.]

SEEK not, dear reader, to penetrate the gloomy mystery appertaining to the authorship of this brief contribution, nor attribute sinister motives to the writer if his "suggestions" have a smack of sarcastic truth. The animus which prompts this screed is simply and solely a desire to improve the methods of travel and to cater to the traveling public in such a manner that a life upon the rail will seem an Olympian existence contrasted with the humdrumishness of every day life.

Traveling is the greatest pleasure one may enjoy, if the conditions are favorable for enjoyment. It is also the most miserable of occupations if the conditions are favorable for misery. Nor are these conditions clear and well-defined, for it is a brief step between those of the first and last-named classes. Traveling, I take it, is like shaving. If the tonsorial artist *is* an artist, and if his razors are well honed and his chair comfortable, a shave is a great luxury. If, per contra, he be a bungling apprentice, with razors keen as a hoe, and a chair like a rail-fence, a shave under these conditions is a lamentable and tearful penance. So, in the language of Marc Antony, let it be with traveling. If railways run their trains with promptness and dispatch, if their cars are well-lighted and heated, if they be clean and comfortable, and if the train service be ample and accommodating, then, traveling is a luxury. But if this pleasing picture is reversed, and instead, the vista opens of lagging trains, dirty and uncomfortable cars, and a surly set of train-hands, farewell to aught but misery, and in the latter you will find a close and inseparable companion.

America is a nation of travelers, and it is doubtful if the citizens thereof quite appreciate the dignity of travel to which they have arisen. Without departing from the confines of a single county many of our countrymen have outdone in actual distance traveled, the wanderings of the tourist sybarite. Take that peculiarly American class of travelers, the "commuters." The commuting passenger travels to and from his place of business, daily, a distance either way varying from five to twenty-five miles, and not infrequently still further. Let us assume that the average commuter travels daily in either direction, a distance of ten miles, or a total of twenty miles daily. This is certainly a moderate estimate, and on this basis I venture to assert that the average commuter of thirty years' standing is a wonderfully traveled individual, before whom Marco Polo and Dr. Livingstone sink into insignificance. Twenty miles per day for six days in the week, is one hundred and twenty miles per week; for fifty-two weeks it becomes six thousand two hundred and forty miles per year, or making allowance for holidays and vacations, a round six thousand miles! This pursued for thirty years, the quiet, unassuming commuter can lay claim to one hundred and eighty thousand miles of travel! Now this is quite a distance. It is almost equal to eight times the circumference of the earth and considerably more than one-half the distance to the moon, and mark you, this distance has been traveled inappreciably. I know of one old gentleman who for nearly fifty years has traveled daily between New York City and his suburban, or rather country home, forty miles away. I calculated that in his simple daily journeys between home and business he has traveled in all, over a million miles! When I told the gentleman that he had traveled twice to the moon and back, and a couple of times around the world he scarcely grasped the idea, and yet cold figures demonstrated that his peregrinations had in sober truth amounted to an equivalent distance. To accomplish this undertaking he had paid an average monthly sum of fifteen dollars—it was considerably more in the early days of railway travel but I take the lowest figures—or one hundred and eighty dollars a year, and in all he has paid into the treasury of the particular road he patronized, the snug little sum of nine thousand dollars.

Now I claim that this class of traveler deserves consideration, and the railways would do well to heed his wishes. Without doubt many commuters live at points distant from their business through motives of economy, preferring a comfortable home in the suburbs at a moderate rental to the cramped quarters offered in a city residence to men of small means, but that sum of nine thousand dollars expended in railway travel might stagger a great many upon mature deliberation, and the conclusion might be reached that a home in the city would, after all, be the cheapest in the long run. It is for the interest of railways that this conclusion should not be reached, and it may be avoided by rendering the daily hours of travel a period of luxury. To this end I would offer a few suggestions; some pertinent and a few possibly impertinent according to the caption of my communication.

To begin with, the commuter invariably seizes his hours of travel for the perusal of the daily papers. It follows that this occupation should be rendered as comfortable as possible. The cars should be furnished with buoyant springs and jolting avoided, for the constant vibration and oscillation of the cars is ruinous to the eyesight and detrimental to comfort. For similar reasons the light furnished, especially in the short Winter evenings, should be bright and steady, without glare, and the dismal lamp should be suppressed in favor of gas or the incandescent electric light. Again, the commuter is generally a smoker. There is something about railway travel that is associated with tobacco, and the morning and evening whiffs are indispensable luxuries to the commuter. No one, I think, will dispute this fact, yet those trains run with special

reference to the requirements of the commuting public are furnished with but one smoking-car, which is generally filled before the remaining cars are half occupied. There would be little difficulty in furnishing two or even three smoking-cars to every train of this class, and I doubt not that railway superintendents will do so immediately upon reading this article. They are a well-meaning class of individuals, and by no means the ogres they are generally painted. They are also get-at-able without prostrating one's self upon the ground and crying aloud to Allah in the oriental fashion, despite popular opinion to the contrary. Speaking of smoking causes me to wish that the railways could introduce sumptuary laws regarding the quality of tobacco used by their patrons, but this I fear is impracticable. At any rate the introduction of the diabolical cubeb cigarette should be rigorously suppressed. Of all pests to the smoking traveler this is the greatest, and the most senseless. Not long since I was seated next to a youth in a smoking-car and he was consuming one of these death-dealing cigarettes under my very nostrils. I stood it as long as I could, but finally in sheer self-defence asked him to desist in his reckless career, and offered him a choice Havana in the way of a bribe. He responded that he had the catarrh and used cubeb cigarettes as a curative. "This is no hospital! my young friend," was my stern rebuke, and I basked in the admiration of the other passengers for my timely remark. The youth was silenced—but he went on smoking his cubebs.

While on the subject of smoking I would offer another suggestion, to the effect that railways should have smoking-cars of three grades, viz.: for five, ten and fifteen cent and upward cigars, and pipe and cigarette smokers should be relegated to the first grade. This is worthy of attention, and the companies should at once consider the question of appointing inspectors who shall examine the smoking materials of each passenger before admitting him to the cars. Jesting aside, while it is impossible for railways to do away with bad tobacco on their smoking-cars, they can at least prevent this annoyance from being caused by their own employés. On many roads the practice is common of picking up a gang of trackmen at points along the line and herding them in the solitary smoking-car of the train, where, with garments covered with dirt, and in a generally unpleasant condition, they puff their "carpet tobacco" in the faces of the regular passengers. In fact the smoking-car is considered to be the police station of the train, and thieves on their way to the penitentiary, and tipsy men reeking with the fumes of stale whiskey, are consigned to it, on the principle that a smoker can stand anything. Dogs, it is true, are consigned to the baggage compartment, but I would sooner have a dog as my companion than a tipsy man, for he is a more rational being, and a great deal better company.

To depart from this redolent subject, I would mention two classes of travelers who merit instant suppression. First the fresh-air fiend, who persists in keeping his window open in the depths of Winter, and his equally familiar antithesis, the anti-fresh-air fiend, who persists in keeping it down in the sweltering days of Summer. I would recommend that there be a universal attachment in all passenger-cars, by which the windows may be closed in Winter, and opened in Summer, and that the passengers be unable to interfere with the operation of the device. The two fiends would then subside, or die, which is still better. Cars could be ventilated without the admission of cold, wintry air, and their non-ventilation is owing to the poor methods of heating generally in vogue. The stove at one or each end of the car is a clumsy arrangement, which either renders the ends or the middle the only comfortable portions of the car. When the ends of the car are comfortable, the middle is too cold, and when the middle is comfortable the ends are too hot. From the nature of the case this will always be so where stoves are employed, and it would seem advisable to place the heating apparatus on the outside of the car, or employ a system of steam heating, drawing a supply of steam from the locomotive.

Am I through? By no means, and yet I shall close. I have been speaking in behalf of the commuter, the humble, unassuming individual who pays his thousands of dollars into the coffers of a railway, but makes no sign, and to whom we must look for the building up of suburban towns and villages. He is a silent power, but he is a power, and his wishes should be respected to a greater extent than they are at present; but in my anxiety to aid his cause I do not wish to overdo the matter. The "suggestions" I have offered are in relation to the unconsidered trifles of railway travel, but they are trifles met with every day in the week, every week in the year, and every year in a business life, and their proper treatment would assure a greatly increased luxury to the commuter. There are other trifles that I might adduce, but I think I will wait until I see what will be accomplished in the reforms I have already suggested, before I refer to others. Railways are big things to handle, and we should be content if their managers make haste slowly.

PROGRESS IN SOUTHERN TRAVELING FACILITIES.

BY WILLIAM S. VEST.

[Written for the AMERICAN RAILROAD JOURNAL.]

IN a late number of the JOURNAL, some account was given of the fatigue, discomforts and delays always attending a journey from New York to Florida in the early days of railway existence in the South, when travelers were compelled to undergo the nine miles of dreary staging from Potomac Creek to Fredericksburg, and for some years later the uncomfortable voyage by sea of over one hundred and fifty miles from Wilmington, N. C., to Charleston, S. C.

During the ten or fifteen years preceding the war of secession, all of the railways in the South had greatly improved their condition; many of them had been entirely rebuilt, with iron rails substituted for the wooden abortions of that name, once universally in use. The locomotives and rolling-stock were in far better order. Not a few were paying good dividends, and new lines were being constructed in every State south of the Potomac. But the breaking out of the war, like a patent air-brake, put a stop to this prosperous state of affairs very suddenly. After four years of hard work for the Confederate government, with very unsatisfactory pay, the roads found themselves either ruined financially or so crippled that many had to go into the *dernier resort* of the miserable—the hands of a Receiver; but as this article is confined to a description of the direct route from New York to Florida, it will allude only to those railways included in it.

Great as has been the improvement between New York and Washington to the traveler in point of speed and comfort during the past forty years, it is but trifling when compared with that made in the same period, south of the latter city. It was there that the passenger southward-bound truly considered that his discomfort commenced. It is far different now. He can, if he takes a "Pullman," go without change of cars from New York to Florida, and sleep comfortably if he chooses while passing through the pine barrens of the Carolinas and Georgia, and in so short a time that he can dine in New York one day, in North Carolina the next, and on the day following eat his lunch on the banks of the St. Johns River. He leaves New York at 9 P. M., and Washington the following morning at half-past six, by comparatively a new route by rail on the Alexandria and Fredericksburg Railway to Quantico (34 miles), and thence to Richmond (82 miles) on the Richmond, Fredericksburg and Potomac Railway, arriving at what was once the rebel capital in only four and a half hours from Washington; thence to Weldon, on the Richmond and Petersburg Railway (22 miles), and the Petersburg and Weldon (62 miles), arriving in that classic town in time for an early dinner. The latter road suffered greatly during the late war. Severe battles were fought for its possession by the contending armies and it finally remained in the hands of the Federal troops, who completely destroyed more than half of its track, and burned its most important bridges. Its loss to Lee's army was a serious damage to the Confederates, compelling them to receive their supplies from one road only—the Southside Railway—extending to Danville. When this too fell into Gen. Grant's hands by the battle of Five Forks, Petersburg was no longer tenable.

But comparatively few readers of this JOURNAL can form an idea of the short time required by an army to destroy utterly the track of a railway. A division of five or six thousand men by spreading itself along a road could, in a few hours, pry up the rails and cross-ties extending for fifteen or twenty miles. By piling up the latter in heaps a few feet apart and setting fire to them, heat was produced sufficient when the rails were placed on these extempore furnaces to bend and even twist them in such shapes as to render them permanently useless. It was the ill luck of the writer to tramp for many weary miles in the wake of Sherman's army, and he was forced to admire the thorough manner in which the work of railway destruction was completed. Many trees had the rails wrapped around their trunks, the ends twisted over each other in neck-tie fashion; of the cross-ties, nothing but ashes remained.

A singular accident occurred on the Petersburg and Weldon Railway many years ago. In December, 1840, a memorable snow-storm prevailed over the entire North and extended as far south as Weldon, where it was encountered by a large party of United States Senators and Representatives bound to Washington. On the way to Petersburg the train moved so slowly and stopped so frequently from constant slipping, that many of the passengers were able to keep up with it by walking. Among the pedestrians was the well-known Waddy Thompson, of South Carolina, Representative in Congress from the Greenville district. He was walking a few feet in front of the locomotive when, his foot slipping, he fell, and on rising was struck and knocked down by the bumper, and the engine passed over him. When extricated he was found to be uninjured. He had fallen into a cavity caused by the removal of a defective mud-sill, not replaced by a new one; this enabled the truck-frame of the locomotive, extending to within a few inches of the track to pass over without touching him. It was the only mud-sill out of place on the entire line of the railway, and as there were more than a hundred thousand of them, the Hon. gentleman stood about as good a chance of escaping unhurt as the United States now has of possessing an efficient navy.

Trains, now-a-days, fortunately stop but a short time at Weldon, long enough, however, to satisfy every one on board that nothing is lost by a speedy departure from such a dreary looking town. In five hours Wilmington is reached; Goldsborough, on the line of railway is now quite a flourishing place; only three towns in North Carolina exceed it in population, while forty years ago it was a mere hamlet. At Wilmington, the trucks of the cars are changed for those having a gauge of five feet; this takes but a few minutes, and is done without disturbing the passengers.

Here, until a little over thirty years ago, the northern mail and passengers bound south took their leave of railways and trusted to the tender mercies of the sea. About that period, the enterprising citizens of Wilmington thought it high time for them to be connected with railways extending to the South and West. Impressed with this idea, a committee started for Charleston and tried hard to obtain assistance in building a railway, striving for an air line between the two cities. The advantages of the route were eloquently set forth; there would be no right of way to pay for; no cuts or embankments required, the country being a dead level; only a few bridges to cross the Santee and Waccamaw rivers were necessary, and the committee guaranteed to build the road down to the South Carolina line themselves. They met with no aid from Charleston. The citizens of that venerable town could not be induced to take stock in the proposed enterprise, nor would the South Carolina Railroad Company, at that time a wealthy and influential corporation, render any assistance. After days of suspense its answer was that it would be "inimical" to its own interests to furnish or even recommend aid to the new project. Back went the Wilmingtonians to their city of tar and turpentine, indignant but not discouraged. A railway they were determined to have, if not to Charleston to somewhere else; and they lost no time in building one—the Wilmington and Manchester—to Kingsville, on the Columbia branch of the South Carolina Railway. As soon as this road was finished, the steamers stopped running, and for several years the only mail route between Wilmington and Charleston was by the roundabout one from the former city to Kingsville, and thence to Charleston by the South Carolina Railway, a distance of nearly three hundred miles. By this arrangement the wise citizens of Charleston soon found that they were left out in the cold. The great Northern mail train with its numerous passengers passed one hundred miles to the north of them, and went on to Augusta, and a great mistake had evidently been made in refusing aid to build the air line road from Wilmington. Accordingly, the Northeastern Railway was hurried through and completed, tapping the Wilmington and Manchester road at Florence, 102 miles from Charleston.

The passengers, after eating supper in Wilmington, now

reach Florence (112 miles) in three and a half hours, and the Savannah Junction, seven miles from Charleston, a little after 4 A. M. Here they are (those bound to Florida) transferred to the Charleston and Savannah Railway, reaching the latter city in ten and a half hours; average speed from Wilmington (315 miles) 30 miles an hour. In Savannah the "90th meridian" time is encountered and watches are put back an hour to suit it. The Charleston and Savannah Railway was completed a year or two before the war, and when hostilities ceased it was in bad order. Financial embarrassments turned its management necessarily over to the tender mercies of a Receiver, and litigation on a large scale was commenced and carried on in a lively manner for years. To gentlemen of the legal profession this proved to be a mine of wealth; they got the oysters, and the poor stock and bondholders the shells. The track became worse with each succeeding year; it was, except at a low rate of speed, unsafe to travel over, and it was said that on this account the Pullman coaches would be withdrawn. It was finally purchased in the interest of the railways north of it two or three years since, and is now in excellent running order. Steel rails have replaced the worn-out iron, and the trestle work and bridges have been thoroughly repaired. From Savannah the passengers proceed on the Savannah, Florida and Western Railway to its junction with the "Way Cross," a road recently completed, and on it they arrive in Jacksonville, 171 miles from Savannah, at noon; a little more than a day and a half from New York.

The traveler who made his only visit to Florida forty years ago would not now recognize the wilderness he was then so anxious to leave. Towns and villages have grown into existence all over the eastern and middle portions of the State. First-class steamers ply daily on the St. Johns River, and fastidious tourists can find no fault with the luxurious accommodations afforded by the hotels in Jacksonville and other places. Railways already give them rapid transit to localities in the extreme Eastern and Western portions of the Peninsula, and in a few years, no doubt, Cape Sable at its Southern extremity will be reached by the same mode of conveyance. Everything is changed since the days when the euphonious names of the Seminole chieftains were as familiar as household words to most people. "Tiger Tail," "Billy Bowlegs," and "Wild-cat" are almost, if not entirely forgotten. One name alone continues to be remembered, and will be for future generations. The owner of it, the best and bravest of them all, is buried under the ramparts of Fort Moultrie, and no true lover of his country can gaze upon his grave without bitterly regretting the treachery of the United States Government shamefully displayed in capturing Osceola.

A striking instance of the way in which the great staple of the South seeks a market by the quickest route was afforded by the completion of the Savannah, Florida and Western Railway to Bainbridge, in southwestern Georgia, some years since. Up to that time Apalachicola on the Gulf, was a lively commercial town, receiving yearly 200,000 bales of cotton. But when the snort of the iron horse was heard on the banks of the Flint River at Bainbridge, all cotton-loaded steamers ascended that stream instead of proceeding downward to the Gulf where, when shipped, the cotton had to undergo the long voyage around the Florida reefs and pay extra insurance for the danger incurred in crossing the Bahama Banks. From that time Apalachicola was financially and commercially killed, and its merchants, like rats deserting a sinking ship, hurried off to Mobile and New Orleans. It is now about as dead a town as the United States can boast of, and Savannah profits by its downfall.

After the passage of the new amendments to the Constitution, the unwashed American freedmen gave great discomfort, particularly in hot weather, to railway travelers in the South. They insisted on having the choicest seats, loudly proclaiming their right to them. But the evil soon corrected itself; our brethren of African descent have, like John Gilpin, a due regard for economy, even when bent on pleasure. By judiciously placing second-class cars on all passenger trains, charging less fare, and above all giving them the privilege of smoking, the negroes willingly accepted the compromise. They generally ignore pipes, but smoke large quantities of villainous cigars when traveling. By their continual migrations from one Southern State to another, they have increased considerably the receipts from passengers. The railways bordering on Texas are the greatest gainers, and the theory that our Southern negroes have strong local attachments has thus been signally refuted.

It will be seen that the traveling public cannot reasonably find fault with the time made by the passenger trains on the railways between New York and Florida; but there is still room for great improvement in this respect. From Weldon to Jacksonville the roads are built mainly on level ground and very few curves are met with. A high rate of speed can safely be obtained with these natural advantages, and with powerful locomotives of the "Wootten" order, 45 miles per hour could easily be made. The distance, too, could be shortened considerably by building a railway from Goldsborough direct to Florence, thus avoiding the elbow formed by Wilmington in the present route. Such a road has been talked of for years past, and sooner or later will be completed; and there is reasonable ground for believing that, judging from the past, before the present century expires, twenty-four hours only will be required to reach Florida from New York.

LUBRICATING AND LUBRICANTS.

BY E. F. DIETERICHS.

[Written for the AMERICAN RAILROAD JOURNAL.]

VII.

LUBRICATORS, OIL AND GREASE CUPS.

THE many contrivances commonly called "lubricators," by which lubricants are applied to machinery, are a source of much trouble to engineers and frequently give them occasion to display their ignorance as to the characteristics and proper handling of these lubricators. The adaptation of these contrivances is with many just as much a consideration of price only, as it is in the purchasing of lubricants; but with lubricators as well as with lubricants the best are the cheapest.

There is the old-style cup, the old-style pump, and the modern automatic devices. With the old-style pump and cup much of the lubricant is wasted, as the feeding is too

instantaneous, and even under careful handling a much larger amount of oil is pumped and spasmodically applied to the parts requiring lubrication than can at once be effectually distributed, so that by use in cylinders much is blown out by the steam and uselessly wasted, and as they require handling, the neglect of timely attention frequently causes the machinery to suffer. This is to a great extent overcome by the modern automatic contrivances which, if properly handled and adjusted, the principle on which they are intended to do their work being well understood, will do the oiling as regularly and economically as any machinery made to abide man's will. There are a great many of these contrivances, the larger number, however, gotten up with no other practical idea than to produce a profitably selling patent contrivance of some kind or another. Some of them appear, at first sight, very ingenious and satisfactory, but fail altogether in possessing the requisites of thorough and reliable lubricators.

The automatic pumps operated by motion taken from the engine and machinery, and pumping the oil to the place to be lubricated, when kept in good order and properly adjusted, allow the most regular and reliable feeding. These pumps lubricate when the engine is in motion, and cease to do so when at rest, and are always ready to start with the engine unless empty through neglect. By this kind of contrivances the oil is conveyed to the place where it is expected to do the work, perfectly cool and unchanged. Contrivances of like construction with spring-motion operated by means of eccentrics attached to the engine and machinery, are also reliable feeders, and oils applied through them reach the place to be lubricated direct and cool. Both these kinds of lubricators give an equally fair chance to all lubricants of any reasonable quality, and only lubricating oils of highly gumming character, or those full of grit and impurities feed through such contrivances with difficulty, if at all.

We come now to the so-called "sight feeding cups." Some of them are very ingenious and useful contrivances; others, however, are merely clever toys and cause much difficulty by the necessity of the operator understanding the principle on which they are intended to work. The mere filling them with oil, turning on steam, opening the valve and calmly awaiting their accurate working will not insure success, and the occasional blowing of steam through with the view of cleaning them is equally fallacious. The oil is, in these cups, in constant contact with water and its impurities, and in many of them, especially if the operator, as above stated, misunderstands the theory on which their automatic working is based, the oil is continuously kept at steam heat. With some oils this would not matter, as they require to be heated to retain fluidity enough for application, but to oils intended to accomplish the greatest absorption of frictional heat—that is, good lubricating—such previous overheating causes great loss of their lubricating power, is entirely unnecessary and positively injurious. The better class of these cups, however, work very satisfactorily, and any shortcomings are the results of ignorance and misunderstanding of the theory on which their working is based.

When starting such cups with oil it requires judgment to secure first, a sufficient amount of cool, condensed water in the cup to control therewith and therewith alone, the automatic feeding of the oil. In many instances, however, the direct steam or the condensed water kept too hot by too much steam on it, is allowed to act on the oil and control the feeding through the cup, and if this has been done for some length of time—especially when an oil of a decomposing nature was in use—the tubes become coated with gummy deposits which, under influence of the latent heat retained by the metal at every change of temperature in the cup, become baked and hardened to the sides of the tubes. If then, an oil not liable to decompose and form gummy deposits is introduced, unsatisfactory results at first must be expected. Such oils applied in small quantities gradually soften these deposits, and swelling, they become finally dislodged and impede the free passage of the oil, and if the oil possesses any good clinging property, oblige it to hang to the sides of the tubes thus coated.

The pretended cleaning of cups by blowing steam through them is another source of trouble, as thereby the fatty deposits from oils in connection with impurities of the water used are baked to the sides of the tubes in successive hard layers by the latent heat held there by the metal, precisely as the scales in boilers are produced from the slimy, earthy deposits from the water by baking and incrustating them to the iron by latent heat under the prevalent and injudicious practice of "blowing off" boilers. If the tubes are kept clean and care is taken to operate the cup on the displacement principle by cool condensed water only, there can be no difficulty in feeding satisfactorily through them as is fully demonstrated by the fact that the same kind of oils which are claimed by some engineers as incapable of feeding properly through their cup are intelligently and satisfactorily used by others through cups of precisely the same make and construction. It requires a little time and patience when starting or refilling such cups to wait until sufficient steam has condensed and enough water accumulated to operate them and get the oil to feed with proper regularity. Introducing some water in the cup before filling with oil and slowly turning the steam on and regulating the feed will prevent overheating and secure and regulate at once the proper condensation and regular displacement of the oil. As the oils are the lubricant expected to do the lubricating, it certainly stands to reason that the cup performing only auxiliary duty could not be proficient, if not suitable for all oils which are otherwise entirely capable and efficient.

There is another endless number of cups of all kinds of construction to apply lubricants to the bearings of shafting and all kinds of lighter machinery; and for feeding oils those appear to command the most attention which allow the operator to judge at a glance if the feeding is regular and uninterrupted. They all require more or less adjusting to regulate properly the amount to be fed and allow the oils to pass through the aperture according to their limpidity or viscosity. In some of them the flow of oil is regulated by regulating the width of the aperture with closing or opening devices; in others a wick is placed in the aperture to secure regular and slow feeding on the capillary principle, and still in others a stem with flattened side to prevent a too rapid flow of the oils. If they are properly attended to and judgment is used in adjusting them in accordance with the characteristics of the oils employed, most of them will answer their purpose satisfactorily.

In those cups which feed with a wick it is very important that the amount of strands in the wick should be in

proper proportion as to the limpidity or viscosity of the oil used, and in those operating with a metallic stem with a flattened side, the latter should be filed still flatter or the stem removed entirely when a change is made from a limpid and easy flowing oil to one which has a heavy body and uniformly retains its consistency. It is also necessary that in all these cups, exposed to varying temperature, only such oils should be used as will not congeal and thereby become unable to flow and feed through the aperture. Frequently also, when changing from one oil to another, and especially when the oil first used was of a gummy character, and the new oil does not possess this quality, the oil may feed well enough through the small apertures without adjusting, but on account of the almost imperceptible coating or gummy film on the close fitting surfaces, it is unable to force its way through; and the bearing running warm, the oil will be unjustly condemned as a poor lubricant. A slight loosening of the screws holding the cap down and allowing the oil to flow in freely and get around the parts to be lubricated will remedy the difficulty, and readjusting the screws, the feeding will go on regularly.

Cups especially intended for feeding grease are also of varied construction and character. These also should have apertures appropriate to the melting quality of the grease used. There are some cups that are intended to force the grease down by weight, by springs, and by hand-pressure, and all, in consequence of this, require constant attention and cannot properly be considered automatic feeders. Those provided with metallic stems to work on the principle that the frictional heat conveyed through them shall melt the grease and make it flow down on them also fail to secure perfect lubrication, as they can only begin and continue to lubricate after frictional heat sufficient to keep the grease melting, has accumulated on the bearing, and as running machinery under increased heat means expansion of the metal and abrasion of the parts, the deficiency of such lubrication is apparent.

All of these grease cups fail to work satisfactorily in places where they are exposed to cold or changeable temperature, and the only reliable and judicious lubricating with grease is through long-slotted apertures in the box which allows the grease to touch the surfaces of the parts in motion. It is, however, always provided that the grease is of a nature to retain a nearly uniform consistency at all temperatures.

(To be concluded.)

A STUDY OF FACTS.

THE investing public ought to be enabled to save themselves immense tribulation and loss by a study of Poor's Manual for the past year. It teems with cautions which should lose none of their force by being embodied in figures. More than this, it reviews its tables and directly announces warnings. There is no form of investment that requires such subtle and watchful discrimination as railway securities. The Manual shows that since 1880, a period of three years, there have been opened in the United States, 28,405 miles of railroad, and that 6,091 miles were opened the past year up to the close of the fiscal years of the several companies. The increase of share capital and indebtedness of all the companies for the three years ending December 31, 1883, was $2,093,433,054, the cost of the new mileage as represented by share capital and debt being about $70,000 per mile. The increase in the three years of the funded debts of all the companies was $924,165,440; of their floating debts, $169,880,406; of the two, $1,094,045,846. It is not probable that the cost of the mileage constructed in the three years equaled the increase of funded and floating debts by at least the sum of $200,000,000. The cost of the mileage constructed certainly did not exceed $30,000 to the mile. The whole increase of the share capital, $999,387,208, and a portion of the funded debt, was in excess of cost of construction. Stocks and bonds to the amount of $530,132,000 were listed at the New York Stock Exchange in 1883. The amount of stocks and bonds listed was equivalent to about $80,000 per mile of new road built during the year. A considerable amount, however, of the securities listed was on account of old works.

It is in this immense increase of fictitious capital that is to be found the cause of the general distrust which prevails, and the enormous decline in the price of railroad securities. From 1879 to near the close of 1883 a most singular delusion rested upon the public as to their value, and this delusion was taken advantage of on a vast scale by able and unscrupulous adventurers. Whatever was manufactured and put afloat was seized with avidity by an eager and uninformed public. The delusion was increased and prolonged by payments on a very large scale of interest and dividends from capital. In this delusion the most loud-mouthed and unscrupulous promoters usually had the greatest success. The delusion culminated about the time of the opening of the Northern Pacific, in connection with which visionary schemes of immense magnitude had been put upon the market. Their worthlessness, and the rapid decline of their securities, exerted a powerful influence over the public mind, which continues unchecked to the time of writing this.

The distrust extends alike to good and bad, so that prices at the present time have as little reference to values as they had at the beginning of 1883. The distrust will probably continue until time shall show what securities are really well based. One cause of the great decline in the shares of lines which were dividend-paying, is the competition resulting from the construction of rival lines. The result of this competition is particularly shown in the two great Pacific roads, the Union and Central, both of which, for many years, have regularly paid dividends, but both of which have now been compelled to forego them. A few years ago there was, in public estimation, no more inviting field for railroad enterprises than the State of Colorado. A vast system of railroads, covering the whole State, was constructed with very great rapidity, involving a nominal expenditure of nearly $100,000,000, almost the whole of which is unproductive.

Such a waste of capital is greatly to be regretted. The remedy, if there be any, lies wholly with investors. In nearly all the states and territories the construction of railroads may be carried on under general laws, and without application to their respective legislatures. In prosperous times the success that old lines have achieved is predicted of every new one, and the public are attracted into the new by having issued to them often three dollars in securities in various forms for one of cash paid in. It not unfrequently happens that the venture, in the outset so promising, involves the loss of all the money actually paid into it. In the greater number of cases the disasters

that have overtaken numerous enterprises, or schemes, could have been easily foreseen, and were foreseen, by persons familiar with the manner in which such enterprises or schemes were gotten up and put upon the market, and familiar with the sources, tendency and extent of the freight and passenger traffic of the districts or sections which such schemes were professedly to accommodate, and the provision already made therefor.

It is safe to assume that the new mileage constructed in the past three years cost about $30,000 to the mile; and that when our people build, say, 10,000 miles of line in one year, they expend upon them $300,000,000.

In addition, a very large amount of fresh capital is yearly expended on old lines, so that we have for many years past been expending upon railroads considerably over $1,000,000 for every working day in the year. Should a large portion of the cost of new lines be lost, the country is undoubtedly the richer by a corresponding amount from the incidental advantages they confer—the opening up of vast tracts for settlement, and bringing within the reach of markets, products which before had no commercial value.

If it be assumed that the cost in money of all the roads in operation in the United States in 1883 did not exceed, as it certainly did not, the amount of their funded and floating debts, $3,787,410,728, the actual investment was a most profitable one. The net earnings for the year were $336,911,884, a sum equaling about 9 per cent. on their cost. If the fictitious capital could be eliminated from their accounts, their success, as investments, would have no parallel. If to net income be added the advantages that flow from them, the result would be a matter of especial wonder. Our railroads the past year transported over 400,000,000 tons of freight. At $25 a ton the value of this freight would equal $10,000,000,000. It is enough to say that, compared with the wealth of the country thirty years ago, they have created on this continent a new nation. While penetrating every portion of the continent, at least wherever our people go, they for the first time create the conditions of a firm and compact nationality.—*Western Insurance Review.*

RAILWAY DISCIPLINE.

LAST week we discussed—or rather, perhaps, rehearsed—some of the points connected with the present state of discipline in the great American army of railroaders, but without coming to any conclusion except the universally accepted one that there is room enough for improvement, but no very well-known way of attaining it. Where we lack knowledge, we can, if we are inclined, guess; and when certainties are not within our reach, speculation sometimes is not wholly unprofitable.

Now, as to discipline, which we think all will agree is the keyword to improvement in the service, what can we learn from others' experience? The management of armies is the most available pattern to study, but the immediate and perhaps insuperable objection there would doubtless be that governments have unlimited money to fall back upon, and that therefore any attempt at imitation of the gilt-edged and stiff tactics of military circles is entirely impracticable and out of place in such commonplace and practical matters as train-running, etc. Governments, being supported by taxes, are users of money, not producers, and officials, whether civil or military, get their habits of mind firmly fixed in the belief that their business is wholly to consume wealth and not to conserve it, while the railroad officer must keep his wits sharpened at both ends, the net *profit* from any given plan or action being always the important question to be decided. But, notwithstanding this objection, we may learn something here; if we cannot copy military manners in their entirety, it may be profitable to study certain features of them. Without attempting anything like a general comparison of military service with railroad service, let us notice one or two points.

A noticeable principle in military operations is, that there is always an officer, with well-defined limits of responsibility, in immediate charge of every undertaking. There is never any uncertainty as to who is "boss"; nót that high officers attend to petty details, but every movement, even if of only a half-dozen men or less, has an immediate director, and investigations of irregularities do not depend so wholly upon the unintelligent and warped testimony of subordinates as we sometimes see in railroad experience. The idea of an officer for every petty job at once suggests the chief objection, expense; but it should be remembered that it is not a high-grade officer that is contemplated, but simply a system that shall always provide for clearly-defined authority. In railroad management there seems often to be a tendency to have a wide gulf fixed between the superiors and the subordinates, thus creating two separate and opposite classes; this does not tend to foster a good and familiar understanding of their respective duties between the different grades, as is always desirable, but rather the opposite. Multiplication of grades of officers and clear division of duties does not, however, necessarily involve much additional expense in every case, the idea being not so much to add more supervisory officers to a given force, but rather to make a more careful and systematic use of the men already belonging to it. A familiar example of the anomalous condition of railroad operating is the ordinary freight-train. The conductor, who is nominally the captain, is nearly always the inferior, both in natural ability and mental training, to the engineman, and his own knowledge of this fact weakens his confidence in himself and impairs his efficiency, not only as concerns his own conduct, but as a director of the behavior of others.

Not infrequently we hear of cases of misconduct and negligence, sometimes serious, which are the direct result of *habits* more or less reprehensible, and which have been long continued, but which the supervising officer avows his entire ignorance of. It ought not to be a difficult matter, with the right kind of officers properly related to each other, to correct this. When superintendents are well informed about the *habits* of their men (as concerns obedience to rules) they will not be taken so completely by surprise by lapses from duty, as is frequently the case at present.

One of the most important principles of military training is the constant *drilling*, which, to the unsystematic mind, is mere useless repetition of meaningless actions, and which appears to the restless and always-take-the-shortest-cut Yankee to be intolerable red tape. And yet it would not be so very far from the truth to say that a considerable portion of the railroad accidents caused by negligence of employés is the result of the general

neglect of this means of instruction. American railroad service is, *par excellence*, the place for those who seek to acquire that proficiency which comes from practice, *after* they assume the responsibilities instead of *before*.

Drilling is the only means of preparing beforehand for sudden emergencies of various kinds. Soldiers behave creditably amid the excitement of battle because they have been taught to do the right thing at the right time without thinking, or at least without appreciable mental effort. A brakeman errs in judgment of distance or time when sent back with a flag because he has *not* been trained to perfect familiarity with the exact requirements of his duty, and so has to do his thinking when his mind is not in the most favorable condition for it. A conductor blunders in reading the time-table because he has not been trained *always* to look at *all* the necessary points. Both conductors and enginemen lazily depend upon each other, because they have not been taught by enforced practice to assume certain responsibilities independently.

Managers assume a certain degree of reliability in their men because the latter have been "taught" to obey certain rules, and the failure of their assumptions could often be explained by a glance at the difference between the term "to teach" and its counterfeit. Telling a person to do a thing is easy, but *teaching* implies mental action on the part of the person taught. His attention must be secured first of all, and in many cases that is not by any means easy. It is very far from certain that a man understands an order simply because he has received a printed copy of it. It sometimes seems as though the *only* way to be certain that a man knows how to do a thing which he has been instructed about is to have him actually do it, and it surely is the only safe way when dealing with large numbers of men of widely varying capabilities. So long as railroads continue to drill their employés only by the "hard knocks" of actual service without close supervision, instead of by preliminary training under proper instruction, where inexperience and ignorance cannot result harmfully, just so long will they continue to have accidents, of which they will want to conceal more or less of the causes. By the former method a man acquires skill by stumbling into it; by the latter he is inducted into it. The former is the more natural way, perhaps; but the other is the simpler and so the better.—*Railroad Gazette.*

THE DINING-CAR SYSTEM.

THE dining-car has probably come to stay with us, and it remains to be seen whether it can be run as a revenue-producing item in railway operation, or whether it must be a dragging expense as are some other matters connected with the passenger department.

Many arguments can be made against the use of dining-cars, but it seems fair to assume that the situation must be accepted as it now stands upon roads which have adopted them, and that the only matters open for discussion are those relating to methods of their economical operation. The dining-car originally was run by a few lines in order to gain an advantage over their rivals, even though not paying operating expenses, as the extra traffic drawn to these lines was supposed to more than balance any loss in their direct operation. As time went on, competing lines followed suit, until now the roads running them are obliged to continue their use or fall behind their rivals.

There are yet a large number of important lines which do not use these cars, and in the case of roads running east from Chicago, while they are used in some lines their rivals seek to avoid running them by means of well-kept dining-rooms at convenient points, and there is not wanting a large proportion of the traveling public which had rather leave the cars and take meals at these rooms than patronize the lines running dining-cars.

We find where dining-cars are run that the results of their use as regards paying their expenses vary widely on different lines and even upon the same roads at different times. In some cases upon the same line they may not only succeed in paying expenses but may even show a material net profit, while again at another period there may be a large net loss. There are, of course, numerous circumstances entering into the methods of operating such cars which have a direct bearing upon the financial result, and it may be of interest to examine into some of the items connected with their management and expense to determine, if possible, the conditions under which such cars can be most profitably run.

There are several well-defined items of expense connected with the running and management of dining-cars. The first is the cost of repairs upon the car proper, or, what amounts to the same thing, the mileage paid in some cases for use of such cars, which is supposed to cover also the bulk of the repairs. Next we have the renewals to the equipment, including utensils, dishes, glassware and linen. We then come to the operating expenses proper, as the former items may be considered as necessary in keeping up the standard of the car and outfit. Under the head of wages we have the amounts paid to conductors, cooks and waiters on such cars. The laundry expenses follow, whether such work is done directly by employés of the company or by outside parties. Then comes the large item of supplies, which covers all the material used in the kitchen, including fuel, and that which goes upon the table as food. The item of supplies may also be divided to some extent into perishable and non-perishable, the former including such articles as meats, vegetables and fruits, which are intended to last but a limited time, and are generally kept by means of ice. The second class includes the standard groceries, condiments and relishes of different kinds, which if not used one day continue good for a greater or less time.

The total expense incurred in running a first-class dining-car for a year may be assumed as not far from $15,000 to $20,000, depending to some extent on the character of the business done and the expense incurred upon the outfit and operation. This total, which is made up of the different classes of expense which we have just detailed, may be divided into two groups, one in which the amounts expended are independent to a certain extent of the business done by the cars, while the other increases or decreases in amount to a degree more or less proportional to the volume of business received. Under the former class we may include the cost of repairs or mileage, the renewals to equipment and wages of employés. Under the second class we may include the supplies and laundry expenses.

The matter of supplies is by far the largest single item involved, but the fixed expenses, as they may be called, amount to a considerable percentage of the whole, so that the larger the business done the less the cost per meal for

such expense. While, also, the matter of supplies increases or decreases to a certain extent with the business done, such variation is less than that on the amount of business. It follows, therefore, that even with this class of expense the cost per meal is decreased as we increase the number of meals given. Under such a condition of affairs it seems to be a necessity that each car should feed as large a number of persons per day as possible in order to make the operation of the system a success. In our estimation, we are assuming an attractive but not too varied or extravagant bill of fare, and the highest perfection in methods and neatness of cookery and serving. Under such a condition of affairs, the best data we have been able to obtain seem to show that where the cars are run to serve two meals per day on each one, they can hardly, by the most economical management, be made to pay expenses at seventy-five cents per meal. If three meals are served, with a reasonably good attendance, the expenses per car should be fully covered by the receipts, while if four meals can be provided there is every condition for an economical management to show a moderate profit at the end of the month in each car. Four meals per day may be assumed as the limit that can be served per car and due time be allowed for each. But to supply four meals per day will demand good calculation in the arrangement of the dining-car runs so as to serve different trains.

There is one important item in relation to the economical running of dining-cars and that is the question of reduced rates to train men. While it seems fair that some reduction should be made to employés, as the company would not desire to make a profit from their meals, still there should be a limit both to the number of employés who should be entitled to such reduced rates, and also to the amount of such reduction. While it is urged that a certain amount of provision is provided, no matter what the number of consumers may be, and that it is better to use such material up at even low rates than to waste it, it must yet be remembered that the partaker of the meal uses his full proportion of the plant and also of the eatables which are not strictly perishable. If, for instance, a rate of twenty-five cents per meal is allowed to employés other than those actually employed in the car, it would seem but just that some limitation be made to the bill-of-fare, and that the meal in character and variety be reduced more to a par with what the same money would bring elsewhere. This closing suggestion may be considered as having an extra economical sound, but the dining-car at best is an expensive adjunct to our roads, and it is really necessary to watch every avenue of expense, especially when we remember the remark in the *Car-Builder* that "it has come to stay."—*Railway Review.*

Railway from Sweden to Lapland.

THE North of Europe Railway Company (Limited) has been formed in London, for the purpose of constructing a line of railway from Lulea in the Gulf of Bothnia to Ofoten Fjord in the North Atlantic Ocean, and thereby opening up the rich stores of mineral wealth in that part of Lapland, and especially in the mines of Kirunavaara, Liosavaara, and Gellivaara. The legal guarantee has been deposited with the Swedish and Norwegian Governments, and Mr. P. Von Ehrenheim and Captain C. G. Hjertaboth, gentlemen of high standing in Sweden, and Lieutenant Lund in Norway, have been appointed resident directors. It is expected that one-third of the line, the Lulea-Gellivaara section, will be completed before the end of this year, the country being fairly level and easily traversed. Great results are anticipated by the local authorities from the opening up of the districts by this railway and also in peopling the northern provinces of Sweden, which now consist principally of waste lands, and are almost uninhabited. The province of Norrbotten, in Lapland, contains 105,000 square kilometers out of the 440,000 which form the whole of Sweden (nearly one-fourth of the kingdom), while its population only amounts to 92,000, or to not quite one person per square kilometer; nevertheless Norrbotten is Sweden's richest province, its iron ores being unsurpassed anywhere in quality or magnitude. The great drawback to this province has always been the want of communication with the other parts of Sweden; along the banks of the river Tornca the land is fairly well populated.

Railways in Queensland.

THE annual report for 1883, says the *Railway Age*, of the commissioner for railways of Queensland, the northeasterly subdivision of the continent of Australia, contains some interesting particulars, in view of the fact that the railways of that country are owned and operated by the government. The total mileage at the close of 1883 was 1,038 miles, of which 141 were completed during that year. The average cost per mile is given as about $34,165, inclusive of equipment, making a total expenditure up to December 31st of last year of a little over $39,000,000. The largest system, the Southern and Western, embraces a mileage of 516 miles, the main line extending from Brisbane to Mitchell, a distance of 370 miles. The Central railway extends from Rockhampton to Pinehill, 252 miles, with a branch from Emerald to Clermont, making 307 miles in all. All the railways, with one small exception, extend from the coast westward into the interior, and no connecting lines have been constructed. A line along the coast is projected and a small portion of it built. If the immense interior tracts are at all adapted to settlement, the present railway mileage will have to be multiplied many times before the country is fully supplied with facilities for transportation. That the railways are fairly profitable is evident from the fact that the interest paid by the net earnings for the year on the capital invested was 4.218 per cent. The total receipts for 1883 were $2,952.755, and the operating expenses were 49.33 per cent. of the amount received. The revenues from freight were 70.98 per cent. and those from passenger traffic 29.02 per cent. of the total receipts. The revenues from the transportation of live stock were comparatively small, being only 2.53 per cent. The total average receipts per mile were $2,840, showing a light business compared with that of the roads of this country. The general condition of the manufacturing interests is indicated by the fact that locomotives, car-wheels and axles and car-trimmings are necessarily imported. The cost per mile of these railways built by the government is notably less than that of the lines in other British colonies. The Queensland railways are of three feet six inches gauge and cost £6,833 per mile, while those of New South Wales, which are of stand-

ard gauge, cost £12,499 per mile, and those of Victoria, the gauge of which is five feet three inches, cost £14,573 per mile. Those of South Australia, the guages of which are five feet three inches and three feet six inches, cost an average of £6,094 per mile. These wide variations would seem to indicate not only a difference in natural obstacles to be overcome in constructing the respective lines, but, also, it may be, a difference in governments.

Altogether it would seem that the operation of the railways by the government of Queensland is very successful. The mileage is small, the traffic is moderate, and the number of employés is not large. The country is a province—not a continent. If the interests represented by this admirable report were multiplied a hundred fold they would become far too large to be controlled by any government with justice to itself or with safety to the people. Queensland is small and isolated now, and the success of government construction and operation of railways in a country so peculiarly situated affords few final conclusions as to the best policy for a country, several of whose railway systems surpass in the magnitude of the interests which they include, those embraced in all the departments of the government of that colony.

Early Ideas of Railway Construction.

THERE is a touching simplicity in the following "instructions" taken from the London Encyclopædia of 1829: "In laying out a line of railway no further general rule can be laid down than that regard should in the first place be had to such a direction and such a declivity as may best suit the nature of the ground through which it passes, and the trade to be carried on upon it. If the trade be all or chiefly in one direction, the road should of course decline that way, so that the wagons, with their contents, may descend upon this inclined plane as much as possible by their own weight. If the exports and imports be equal, the road should be on a level; and, when the ground will not permit that declivity or level best suited to the trade, the line should be varied, and the inequalities made up, so as to bring it as near as possible to the proper standard. If the inequalities are such as to render this impracticable, the only resource lies in inclined planes; for instance, when the difference of level between the two extremes of the road is such as would render an equal declivity too steep, the road must then be carried either on a level or with the due degree of slope, as far as practicable, and then lowered by an incline plane, on which the wagons are let gently down by means of a brake, and dragged up by means of an additional power to that which draws them along the road, or at once let down and drawn up by means of a roller or pulley."

Car Awnings.

COMPLAINT is made in Mexico, of the extreme heat often prevailing in the Pullman cars, caused, not by the temperature of the air, which is not excessive on any part of the tableland, but by the fierce rays of the tropic summer sun beating down on the roofs and heating the cars like ovens, so that they do not cool off until far into the night. The remedy for this, says the *Mexican Financier*, would be double roofs, or their equivalents in the shape of awnings stretched over the roofs, an expedient which has been tried with great success elsewhere. It is probable that by this means the heat could be reduced by several degrees, and one of the greatest drawbacks to travel by railway removed. The car of the general manager on the Sonora Railway is thus provided with an awning which gives the most satisfactory results. In order not to obstruct light and air from the ventilating windows it would be advisable to divide the awning into three sections, one being stretched over the raised portion of the roof, and the remainder over the roof at the sides, below the ventilating windows. It would probably be also desirable to protect the roofs of the first-class cars in the same way, the additional comfort thus giving them a most substantial advantage over the second class.

The Uniform Railway Signal System.

THE following is the system of uniform railway signals adopted by the recent Time Convention held in Philadelphia, on October 9th:

HAND AND LAMP SIGNALS.

Go ahead—A motion up and down.
Stop—A motion crosswise with the track.
Back up—A motion in a vertical circle.
Train parted—A motion in a vertical circle at arm's length across the track, given continuously until answered by the engineer.

BELL-CORD SIGNALS.

One (1), (when train is standing) start.
Two (2), (when train is running) stop.
Two (2), (when train is standing) call in flagman.
Three (3), (when train is running) stop at next station.
Three (3), (when train is standing) back.
Four (4), (when train is running) reduce speed.

WHISTLE SIGNALS.

Signals.	Use.
——	Signal for approaching stations, railroad crossings, and junctions.
o	Apply brakes; stop.
—— ——	Off brakes; start.
o o	Answer to any signal, except train parted.
—— —— ——	Train parted.
(S) o o o	Back up.
(R) o o o	Calling attention to signals carried.
—— —— —— ——	Call in flagman.
o o o o	Engineer's call for signals from switchmen, watchmen and trainmen.
—— —— o o	Road crossing.
o o o o o	Send flagman out.

Succession of short sounds.....Stock alarm.

Explanation of signs: o, short sound; ——long sound; (S) slow pulls; (R) rapid pulls.

STATIONARY AND FIXED SIGNALS.

Danger, stop!—red.
Caution, proceed with care—green.
Safety, track clear—white.
Stop for traffic—white and green.

All signals should be placed on the engineer's side of the track as he approaches them, unless the land contours make them more easily seen by the engineer if placed on the other side.

Switch targets should be placed on the engineer's side as he runs toward the point of the switch, as there is more danger when running in that direction than through the switch.

In case separate signals for trains in each direction are placed on the same standard, the arm on the right side, as the signal is approached, should ordinarily govern the movement.

Signals for trains in one direction only, should ordinarily project from the right hand side of the upright, as one stands facing it in the direction of the traffic.

Danger signals for rear protection, should be displayed in an elevated position to the rear only, and never shown when the train is on the main track.

FIXED SIGNALS ON TRAINS.

A green signal carried on the front of the engine to indicate a train following with the same rights as the train carrying the signals.

A combined green and white signal carried on the front of an engine to indicate a train following which is irregular.

A white signal carried on the front of an engine to indicate that the train carrying the signal is itself irregular.

The rear of every train, passenger or freight, should be plainly marked to enable those interested to know that all the train has passed. Green markers are to be used for this purpose, and they should be combined with the signals, so that one lamp can serve both purposes.

TORPEDO SIGNALS.

One (1) danger, stop!

Two (2) caution, run carefully.

The signal for danger to consist of fewer detonations than the one for caution, so that if one cap fails in a caution battery the signal becomes one of danger.

CONCERNING THE USE OF SIGNALS.

The danger signal to be used to indicate train orders.

Trains on sidings, to clear, should remove their signals of danger and display those of caution, otherwise trains passing on the main track will be stopped.

The rear of the train is the part that, when the train is proceeding in its authorized direction, will pass over a given point last, and markers should be displayed on that part and no train should be reported or considered by, until the markers are seen.

Fast Railway Speed.

A YEAR ago the Great Northern Railway Company commenced to run between Manchester and London in four and one-half hours, a distance of 205½ miles, stopping at Grantham and Sheffield only. Their example was followed speedily by the London and North Western Railway Company, who have, however, a distance of only 189 miles. This month, however, the Great Northern Railway Company have further reduced their time to four and one-quarter hours. It remains to be seen if the rival line can do their 189 miles in four hours, which it should manage with the difference of sixteen miles in its favor. So far the Midland has taken a longer time than this, and this line is unfavorably handicapped by its heavy climb to Peak Forest, but its fastest train is timed to four hours and ten minutes.

Theatrical Traveling Expenses.

A NEW YORK *Tribune* reporter recently asked Manager Collier of the Union Square company what amount he spent annually in railroading. Mr. Collier replied: "That is something that I have never figured out exactly, but I can give you the basis for a pretty close calculation. My average fares for each company will be about $125 a week. For the five companies playing on an average thirty-seven weeks each, this amounted to over $23,000. But that sum does not include the expenses of the home company, which generally travels for eight or ten weeks prior to their playing at this theater, or the freight on printing shipped in advance of each company to every stand at which it plays, or my own expenses on the frequent trips I am compelled to make. Altogether, the amount we annually pay to railroads must be considerably over $30,000. With each of the 'Storm-Beaten' and 'Lights' companies," continued Mr. Collier, "is a car for scenery, built by the Pennsylvania Railroad according to my design. Each car is over sixty feet long and contains two low trucks, on which the scenes are packed. When the car arrives in a town, these trucks are pulled out and hauled to the theater, and after the performance are reloaded and once more put in the car. By this arrangement a vast saving of time, labor, and wear and tear is avoided. Indeed, if it were not for this plan, it would be impossible to present such heavy pieces in one night stands. The 'Lights' requires eleven complete scenes, and though 'Storm-Beaten' has not as many, the elaborate character of several of the sets causes almost as much 'stuff' to be carried. With each car goes every 'property' required in the representation, except ordinary furniture procurable in every theater, including calcium lights and machinery for producing the aurora-borealis effects, so that I give just as perfect a presentation in every particular at, say Penn Yan, as I did at the Union Square Theater. Each of the cars, with its scenery, properties, etc., is insured for $10,000."

Military Railways in France.

THERE are now four railway companies of the French army (*compagnies militaires d'ouvriers de chemins de fer*), one being attached to each of the four regiments of engineers. Their peace footing is a low one, and they are brought up to their war strength by calling in the reserve men dismissed to their various employments in the service of the railway companies. Under the new reorganization scheme the men of the railway troops are to be retained under the colors only one year. They are then to be distributed amongst the various railway companies, further trained in their respective duties, but treated and paid like the other railway employés, so that they are no further expense to the state. The war strength of a company is as follows: Six officers, three hundred men, fifty drivers (*sapeurs conducteurs*), eighty-two horses and eighteen carriages. According to the scheme of reorganization, four additional companies are to be formed.

IT is asserted on engineering authority that the best wood yet discovered for railway sleepers is zapote, used for this purpose in Mexico. It is essentially a tropical timber, and is exceedingly durable for outdoor or indoor work, above or below ground. Samples of this wood taken out of buildings said to have been erected more than two centuries ago did not show the slightest indications of decay, the wood being as sound as on the day it was put into the building. In color this wood is nearly as dark as logwood, is very heavy and sinks in water, and so hard that the boring of holes for spikes and forming the grooves for rails is very laborious work. It appears to be almost impervious to decay, but has a tendency to split if exposed to the heat of a tropical sun for a few months; for which reason the zapote sleepers have to be equally covered with ballast.

IT is interesting to know, that so long ago as 1848, express trains had arrived at a maximum speed which has not since been exceeded. Below is the copy of a card issued at that time as a memento of the speed of a Great Western train between London and Didcot. The speed here chronicled is at the rate of 67.95, or, allowing for starting and stopping, more than sixty-eight miles an hour. We doubt if many of the present expresses are timed to run at more than fifty miles an hour: "Great Western Railway broad-gauge engine 'Great Britain,' which accomplished the fastest journey on record, namely, from Paddington to Didcot, 53¼ miles, in 47 minutes. The train was the 9¼ express to Bristol, and consisted of four carriages and van, and was driven on May 11, 1848, by J. Michael Almond, driver; R. Denham, fireman."

American Railroad Journal.

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FORGING AHEAD.

THE JOURNAL makes its appearance this month with a new and emblematic cover, and in every respect comes up to the required standard of a railway magazine and review. Our appeal for contributions on "business principles" have met with success, and we are rapidly increasing our corps of contributors, which gathers strength with the increase. The total number of contributed articles appearing in the JOURNAL since the change of policy and management inaugurated with the June number, now amounts to twenty-six, covering a variety of topics, and all of contemporaneous interest; but there will always be room for more, however, and we reiterate our oft-expressed invitation to railway men for contributions of value.

But it is equally gratifying to observe that the JOURNAL is being recognized as of value to railway literature, and despite the dullness of the times our subscription list is steadily on the increase. Complimentary letters are constantly received, enclosing the amount of a yearly subscription and stating that the JOURNAL is filling a special field in furnishing the railway world with an interesting magazine and review; and it does seem as if the magnitude of interests in the operation of railways calls for something a little more dignified than is found in the average trade journal, despite the latter's undoubted usefulness and ability. It is needless to state that our subscription list can never increase too rapidly, and having on several occasions appealed for contributors in behalf of our readers it would not seem amiss at this juncture to appeal with modesty for subscribers in our own behalf. This we do, letting the JOURNAL stand upon its own merits, and confident that the appeal will not be in vain.

THE RESULT.

THE present month has witnessed an election which assures a complete change in our national government on the 4th of March next. We have consistently avoided political discussions in the columns of the JOURNAL, holding to the opinion that it was not the province of a publication devoted to the interests of any one trade or industry to display partisan tendencies; none the less have we held to our personal preferences as citizens. With these preferences we have nothing to do and we would not allude to the election at all, were it not an occasion of such magnitude and importance that an omission in this respect would savor of indifference. The effect of the election upon the futures of the two great political parties is not a matter we shall consider. As representing the interests of railways we have solely to do with the effect of the change upon this industry, for such in sober truth they may be called. Railways are quick to feel the

benefits of active commerce, and a revival of business is nowhere sooner appreciated.

It cannot be denied that the business interests of this country have felt reluctant to transfer the administration to the Democratic party. It is likewise true that the nation at large has been slowly coming to the conclusion that a change in the control of the government would give a healthy tone to politics, in the fact that both parties would feel that they could only remain in power during good behavior. Doubtless the first-named prejudice was simply prejudice, and had no better foundation than the not unnatural distrust of new men and new methods, for the Democratic party has so long been out of power, that its old leaders have retired giving place to new men, while its principles and methods have also undergone modification. Be that as it may, the Democrats have now the opportunity of proving their patriotism and integrity. It is folly for its members to suppose that the narrow defeat which the Republican party has sustained will disrupt the latter, or that the country at large is disposed to regard the Democrats with especial favor. There has simply been a change, in no way remarkable for its sweeping character, and it will take but little mal-administration on the part of Democratic leaders to overcome in 1888, their narrow majority of 1884. It is idle for them to pretend that the whole Republican party is corrupt, basing this assertion upon the fact that corruption has been unearthed in high places. It is the fate of any political party which for a score of years and more has remained in undisputed control of a national government, that certain evil elements will be attracted to it by the opportunity offered for corrupt gain. Noxious weeds spring up in stagnant water, and a political party that has its own way year after year must, to a certain extent, become stagnant. The Democrats found their weeds in their day, and so have the Republicans; they were natural and inevitable conclusions. The Democrats are now on trial, and if in the next four years they maintain the credit and honor of the country as well as the Republicans did in the first years of their power, they will have done well.

Regarding the business interests of the country, we do not believe that they are as dependent upon partisan ascendancy as politicians would have us think. There will always be, in a country of such boundless resources, periods of prosperity and depression succeeding each other at greater or less intervals. The very wealth and extent of our natural advantages tend to this result, and a country of poor resources maintains a steadier condition of affairs—never so prosperous, but rarely if ever subjected to the same fluctuations in national trade and commerce. We look for no quick change in either direction through the success of the Democratic party, but its leaders undoubtedly can do much to hasten or retard a return to prosperity. Honesty, conservatism and integrity on the part of those in control of the government, can have an effect upon national prosperity—but in great measure, if not entirely, it depends upon the men and not upon their party.

We regard President-elect CLEVELAND as an honest man with a clear head, and this belief which is wide-spread and meeting with general acceptance, should do much toward allaying the fears of difficulty always attending a change of government; whether he possesses the requisites of a President, and whether he will be able to withstand the partisan pressure that will be brought to bear upon him is another question. We sincerely hope he will. If, as a result of his election, we are given honest Civil Service Reform, if public office will be regarded as a reward of merit, and not of partisan service, if the industries of the country are not subjected to sudden shocks through "experimental" legislation on the tariff and other questions, and above all, if the insidious nourishment of sectional hatred is wiped out, and we are given a country with no North and no South, we shall rejoice at his election. If none of these sorely needed results are brought about we shall regret it. With one of his public utterances we are in hearty accord. We join with him in demanding a "government conducted upon business principles." Such a government, we honestly believe, will accomplish all that we can ask for, and will usher in an era of peace, prosperity, and fraternal spirit.

Undoubtedly the election of CLEVELAND is a source of great joy to the Democrats who have come up to the polls six times in succession to suffer defeat. Undoubtedly the defeat of BLAINE is a source of great regret to the Republicans who have been successful in electing their candidate for the past twenty-four years. But the extreme closeness of the election, the clearly demonstrated fact that the two great parties are almost equally divided in their claims upon the suffrages of our fifty-five millions of people, should do much to moderate the feelings of both. There is a brief and comparatively unknown verse of poetry that can be quoted here with singular appropriateness, and we give it, in confidence that Democrats and Republicans alike will perceive and appreciate its application:

"Glad—but not flushed with gladness,
For joys go by;
Sad—but not crushed with sadness,
For sorrows fly."

Let us one and all forget our partisanship and extend a helping hand to the new administration. National honor, prosperity and wealth are heritages belonging not to men nor parties but to the people, and should these accrue to us through the change of power, let us not claim them as partisan achievements, but the work of a great people guided by honest leaders. GROVER CLEVELAND on the 4th of March will become President of the United States, and as such he is the property, the heritage of the people—

not of his party. The candidate departed with his election, and the sooner we make up our minds to rouse ourselves and tread the paths we have chosen, the sooner will business prospects brighten, and trade be revived. The 4th of November was a day of bitter partisanship and strife, but it is happily over; and let us so pursue the even tenor of our way during the intervening four months, that the 4th of March will see us one people, ready to welcome our chief executive with honest wishes for his success and prosperity in the mighty task he will take upon himself to carry through in the sight of God and man.

CAR-COUPLINGS AT THE MASTER CAR-BUILDERS CLUB.

THERE was a good attendance at the rooms of the Master Car-Builders Club, on the evening of November 20th, the subject for discussion being "Automatic Freight Car-couplers," and although there were not as many models on exhibition as were brought forward on former occasions, it was gratifying to notice that much of the chaff has been blown out of car-coupling exhibitions, and the wheat that is left has improved in quality. Many of the worthless traps that have heretofore been forced into prominence by a flourish of trumpets and boasts of solid financial backing were conspicuous for their absence, and this fact alone is substantial evidence that the coming coupler is not far off. There was a keen interest manifested by those present, and, as an old timer at these exhibitions expressed it, "the coupling business is getting down fine."

It has been noticed that a majority of the master car-builders have, on former occasions, stated that an automatic coupler was not so much needed as a safety coupler, meaning that safety in coupling is the thing sought for. But of course cost, durability and reliability will be a consideration. The matter of changing coupling attachments is expensive at best, and it would ruin any railway company in the land to equip their cars with the costly automatic couplers that are being pushed by stock companies, regardless of merit. But no railway company need be subjected to a great expense in securing a safety coupler unless the stockholders tamely submit to systematic robbery through the crookedness of their officers, who stand under the tree while it is shaken by committees and commissioners and help themselves to the plums.

From the present day until next March we may look for a large number of tests of coupling devices, and it is expected that by that time the best will be selected for general adoption. But there are those who believe that the best will not be selected for trial, and this remains to be seen. At any rate it does not seem just the thing to rest the case in the hands of a committee and limit them to five couplers for trial, inasmuch as it will be impossible under such a ruling to avoid injustice to many worthy inventions and inventors. This is too serious a matter to trifle with or speculate upon, and let us hope for straightforward and honest dealing by those in authority.

EDITORIAL NOTES.

THE activity and rivalry manifested by car companies is decidedly on the increase, and as a result the trunk lines are being equipped with passenger cars of almost dazzling splendor. Altogether the present year has been a good one for the travelling public, and what with wars of rates and an eager strife for supremacy in the matter of rolling-stock and equipment on the part of the railways, the passenger smiles benignly and calls for the good work to go on.

* * *

IT has been claimed that the railway interests of the country are dependent upon Wall street, and that an attack upon the methods prevailing in that tortuous financial alley is a direct attack upon railways. It may be noticed, however, that this "claim" is made only by Wall street, and its falsity is shown in the fact that of all the railways in the country, not more than fifteen per cent. are listed by the New York Stock Exchange.

* * *

WORK upon the pedestal for the Bartholdi statue has been brought to a standstill through lack of funds, and we are further edified by a disagreement between the committees of the Sons of the Revolution appointed for the purpose of collecting dollar subscriptions, and the general committee headed by Mr. EVARTS. Meanwhile we are rapidly gaining the reputation of being a small-minded people, and the stigma is not undeserved. Eventually Congress may step to the breach and appropriate a sum of money that will assure the completion of the pedestal by the commencement of next Summer, but none the less has our course in the matter been contemptible. It strikes us as an admirable scheme for the exultant Democrats to celebrate their victory by contributing the necessary sum out of their own pockets. They have won a national victory for the first time in twenty-four years, and an opportunity is here afforded them for a noble "celebration." Haven't they any of the campaign fund remaining which they could contribute to this worthy object?

* * *

PROBABLY few people have an idea of their individual importance to the nation, or of the amount of commodities which they require in one way or another. Yet according to reliable statistics the railways of this country during the year 1883, carried nearly 500,000,000 tons of freight, or almost ten tons for every man, woman and child within its borders. The great problem for every one to consider is the query: "What did I do with my ten tons?"

Street-Railways.

American Street-Railway Association.

President.—Calvin A. Richards, President Metropolitan Railroad Company, Boston, Mass.

First Vice-President.—Julius S. Walsh, President Citizens' Railway Company, St. Louis, Mo.

Second Vice-President.—Henry M. Watson, President Buffalo Street Railroad Company, Buffalo, N. Y.

Third Vice-President.—Edward Lusher, Secretary and Treasurer Montreal City Passenger Railway Co., Montreal, Canada.

Secretary and Treasurer.—William J. Richardson, Secretary Atlantic Avenue Railroad Company, Brooklyn, N. Y.

The Fourth Annual Convention of the Association will meet in St. Louis, Mo., on October 14th, 1885.

Office of the Association, cor. Atlantic and Third Avenues, Brooklyn, N.Y.

IN EXPLANATION.

WE are in receipt of the following letter from Secretary RICHARDSON, of the American Street Railway Association:

OFFICE OF THE AMERICAN STREET-RAILWAY ASSOCIATION,
BROOKLYN, N. Y., Oct. 23d, 1884.

Editor of the American Railroad Journal:

DEAR SIR:—At the final meeting of last year's officers and Executive Committee of this Association, unanimous expression was made in opposition to the use of the word "tramways," as it appears at the head of your street-railway department.

The request was made that the Secretary use his influence with the paper to have the word changed to "street-railway." The word "tramway" is of foreign derivation and use only, and has not found favor either in the United States or Canada.

I make this application, therefore, on behalf of the American Street-Railway Association, confidently believing that you will change the title of this department, as suggested, and abandon the further use of the words "tram" or "tramway" in connection with street-railways. I doubt not it has already been made manifest to the management of your ably-edited journal, that these words will never come into general use in this country.

Wishing the paper a large business success, I remain,
Very respectfully yours,
WM. J. RICHARDSON, Secretary.

In response to the request of the Association the title of this department of the AMERICAN RAILROAD JOURNAL is changed from that of "Tramways" to "Street-Railways." We consider that the American Street-Railway Association, should be the supreme authority and on all questions of this kind, and in the future—for the present at least—the word "tramway" will not be used in our columns.

We wish it distinctly understood, however, that we do not abandon the position we took upon christening this department with the name of "Tramways." We still hold to the belief that it is in every way the better word, being briefer, more specific in its meaning and easier of pronunciation. Neither do we agree with Mr. RICHARDSON that the word will never come into general use in this country, for its utility will some day be appreciated, and the cumbersome terms of "street-railway," horse railway" "surface road" and the like will fall into disfavor; but we do not hesitate a moment in making the desired titular change. We consider it our duty to recognize the Association as the arbiter on all street-railway questions, and therefore bid a long and reluctant farewell to "tramways."

THE STREET-RAILWAY CONVENTION.

THE Third Annual Convention of the American Street-Railway Association, an account of the proceedings of which will be found upon the ensuing pages, is now a thing of the past; but the beneficial influence which will result from the reports submitted and the discussions held, will last until the ensuing meeting. Indeed an examination of these reports will show an exhaustiveness and singleness of purpose on the part of the gentlemen submitting them, which will render their influence perennial. It was our original intention to publish all of these reports in the current issue of the JOURNAL, immediately following the summary of the meeting, but their great length, and the demand in other quarters for their immediate use in preparing the official minutes of the Convention compelled us to be content with three of them, which we print in this issue with the assurance that the remainder will be found in the December JOURNAL.

The reports speak for themselves, and it is not our purpose to enter into a criticism of them—at least not at present. They have been prepared through the unceasing efforts of the various members of the respective committees, and they represent the combined wisdom and experience of the ablest men in the business. That their dictum on matters of such importance should be regarded as that of a court of last resort, seems but natural, and certainly the discussions ensuing upon their presentation should almost entirely settle whatever of doubt may have existed on the expediency of the questions involved.

The convention was a success from every point of view. Not only in attendance, nor in the new membership acquired, but also in the character of the proceedings and their usefulness to street-railway interests. But why—and we ask it in wonderment—does not every street-railway in the country recognize the benefits of membership in the Association, and by the payment of the trifling sums necessary, acquire it and its resulting benefits in the natural way? Take the single question of the removal of snow and ice from the street-railway tracks in Winter. How often has this question been discussed, and how varied the opinions held thereon? If a single street-railway company, desirous of full information on this point, should endeavor to obtain it with the same fullness and accuracy characterizing the report submitted to the Association on that subject which we print on a following page, to what expense and to what labor would it be put in obtaining it? And yet here is the Association, with the wealth and scope of experience of its entire membership, offering its services at a nominal cost to every street-railway in the land for the purpose of imparting this and kindred information.

It is an old saying that two heads are better than one, and certain it is that the combined experience of over a

hundred street-railway managers is better in the consideration and settlement of problems connected with the operations of roads, than that of single persons and single companies. It is this combined experience which the American Street-Railway Association places at the disposal of every company in the United States and Canada; and we hope the time will not be long before the value of membership in the Association will receive full recognition. Those street-railways not as yet belonging to the Association can hardly expect a continued recognition in the way of printed reports and pamphlets that have heretofore been distributed in a generous spirit by the organization, and sooner or later they will either have to acquire membership therein or remain hopelessly behind the times. The increase of membership at the recent Convention was remarkable, over forty roads having applied for it, and we trust at least this rate of increase will be maintained at future Conventions. Should such be the case it can be but a few years before the street-railways of the country will each and all be members, which is a consummation devoutly to be wished.

We had hoped that the next Convention would be held in Philadelphia, in order that that city with its great street-railway interests would be afforded an opportunity of witnessing the benefits of the Association within its own limits, but on the whole it is probably well that the Conventions should alternate between the East and West in order that both sections of the country should be recognized, and it would also be well if one of the Conventions in the near future should be held in Montreal or Toronto, in order that our Canadian friends should have a chance of showing their progress and hospitality. In the meantime the Association can rest secure in the certainty of the success of the St. Louis Convention in October, 1885.

SHOULD STREET-RAILWAYS BUILD THEIR OWN CARS AND TRACKS?

BY AUGUSTINE W. WRIGHT.

[Written for the AMERICAN RAILROAD JOURNAL.]

THE question has been propounded to me from time to time, "Do you think it advantageous for a street-railway company to build its own cars?" My answer has been in the negative, and the question seems of sufficient interest to warrant an expression of my views more at length.

For what purpose is a street-railway company organized? I will answer in the words of M. M. Kirkman, whose able works, although written for steam-railways, should be read by everyone interested in *any* railway: "In the operation of railroads, the objective point of endeavor is the revenue that accrues from the business transacted. It is for this that the proprietors contribute money for the construction of railroads; it is for this that they are operated." All will agree that dividends for the stockholders is what we are after, and the company that invests in shops and machinery with which to construct its own cars hopes thereby to increase the said dividends. The principal reasons advanced for this policy are, either that the company can build *better* cars for the same money, or as good a car for *less* money. In my opinion this is a mistaken idea, and the companies find it to be so, after investing thousands of dollars in extensive plants. The company is organized to carry passengers and the more nearly it confines itself to this business, the greater will be its profits. I do not believe it to be to the pecuniary interest of any street-railway to enter the domain of manufacturers and compete with individuals or firms in building cars.

No one has a greater respect than I have for the ability, honor and zeal of the master mechanics of our railways as a body, but who can honestly say that if the same men were in business for themselves they would not accomplish more work at the same cost. It is proverbial that the laboring classes work harder for individuals or firms than for railway corporations. The individual has a direct pecuniary interest in watching every detail. He has a reputation to establish or maintain for good work, and competition will ordinarily prevent excessive profits. The individual engaged in manufacturing cars, as the years pass by, accumulates a wealth of experience from his extended practise. He has employés engaged perchance for years, working hour after hour, day after day and month after month, on the *same work*. I saw such an employé recently in New York who has spent *twenty years* past on the same work. Over half a century ago, the importance of this fact was set forth by Charles Babbage, the great English mathematician. Permit me to quote Mr. B.: "Perhaps the most important principle on which the economy of a manufacture depends is the *division of labor* amongst the persons who perform the work. * * * A certain quantity of material will be consumed unprofitably, or spoiled by every person who learns an art; and as he applies himself to each new process, he will waste a certain quantity of the raw material, or of the partly manufactured commodity. * * * Another source of the advantage resulting from the division of labor is, that *time is always lost from changing from one occupation to another.* * * * The constant repetition of the same process necessarily produces in the workman a degree of excellence and rapidity in his particular department which is never possessed by one person who is obliged to execute many different processes. This rapidity is still further increased from the circumstance that most of the operations in factories when the division of labor is carried to a considerable extent, are paid for as piece-work. * * * When each process, by which any article is produced is the sole occupation of one individual, his whole attention being devoted to a very limited and simple operation, any improvement in the form of his tools or in the mode of using them is much more likely to occur to his mind."

These remarks I quote to street-railways, whose equipment is comparatively limited. No single company needs new cars enough to warrant an investment in buildings and improved machinery equal to any of the large firms engaged in this business, and without this improved machinery, convenient and extensive shop room and arrangements, they cannot compete in the manufacture; but as a matter of fact, what president or superintendent of any street-railway building its own cars, *knows the cost of*

the same? The master mechanic, perhaps, keeps an accurate account of the labor and material used in building the new cars. He tells his superior officer that they are *better cars* and have cost one or two hundred dollars less than Smith or Brown offer to build the same car for. But he has neglected to figure in the interest on the cost of plant, taxes on the same, wear and tear of tools, depreciation, etc. *This* all goes to repair account, and who can tell how much the latter would have been without the construction account? It cannot be compared with the reports of other companies because one must know, to judge intelligently, the *relative* condition of the cars, and the amount expended upon each. The only *real saving* is in the item of freight if the manufacturer is not located in the same city or town. I speak from experience when I affirm that as good cars, in each and every respect can be purchased from the manufacturer, as are or can be built by any street-railway company. It is undoubtedly necessary to maintain a repair shop, and as work is apt to vary therein in amount, it is no doubt wise for a company to build for its own use "open-cars" when such are used, to retain its skilled labor and give it employment when otherwise the men would have to be laid off and might make other engagements; but one or two such cars would probably bridge over the slack times of twelve months. I believe that any street-railway company engaging in the manufacture of cars is opening a by no means small "bung hole," and its "bar'l" will surely suffer.

Another matter is track construction. It has been largely the practice with street-railways to build their own tracks, and the condition of their tracks to-day shows the folly of this system. Very few steam-railways find it advantageous to lay their own tracks, and I am at a loss why street-railways should pursue a different policy; but they seem to think that any ignorant man, although perhaps he has never seen a track laid, can do their work if he don't want more than $2.00 or $3.00 per diem. The lack of all mechanical skill evinced in the track construction of many of our street-railways would be laughable if it were not so deplorable. I have seen tracks laid with the *rail-joints directly over stringer-joints.* I have seen a "butcher" cutting into a stringer for joint-chair, cut one end half an inch lower than the other end to bring the rail ends level, and insert a chip from the stringer between the chair and the rail! With such work is it strange that we hear an outcry against "poor tracks?" The labor is hired by the day, and nearly every one is interested, not in doing the best work in the least time, but simply in prolonging the job.

If the contractor was encouraged, the men would be more permanently employed; in a measure his interest and theirs would be identical in doing good work, and the company would get better tracks for the same, or less money than under the present system. As a matter of fact, few companies who relay tracks know *what* they cost by hundreds of dollars, because the expense is mixed up with repairs, etc. The supplies are taken from the storehouse or yard to a greater or less extent, and never appear in the cost of this particular track. These views might be enlarged *ad infinitum*, but I trust enough has been said to call attention to the matter, and the officials of all street-railways will find it to the interest of their companies to consider well before entering into active competition with the manufacturer and contractor.

THIRD ANNUAL CONVENTION
OF THE
AMERICAN STREET-RAILWAY ASSOCIATION.

Summary of the Proceedings.

THE third annual Convention of the American Street-Railway Association was held at the Fifth Avenue Hotel, in this city, on Wednesday, Thursday and Friday, October 15th, 16th and 17th, and in point of attendance, increase of membership and interest in the various proceedings, far exceeded those previously held.

The Executive Committee met an hour previous to the assembling of the Convention, and transacted the business before them, and arranged for the final details of the meeting; and at 10.30 o'clock on Wednesday morning the Convention was called to order by the President, Mr. William H. Hazzard, of Brooklyn, who delivered a brief opening address.

The following delegates of members were present:

Baltimore, Md.: T. C. Robbins, Gen'l Manager the Baltimore Union Passenger Railway Company. Binghamton, N. Y.: R. H. Meagley, Pres., Washington Street and State Asylum Railroad Company; F. E. Ross, Treas., Washington Street and State Asylum Railroad Company. Boston, Mass.: Julius E. Rugg, Supt., Highland Street Railway Company; Charles J. Hayden, Director, Highland Street Railway Company; C. H. Shattuck, Master Mechanic, Highland Street Railway Company; Calvin A. Richards, Pres., Metropolitan Railroad Company; I. H. Randall, Master Car-Builder, Metropolitan Railroad Company. Bridgeport, Conn.: Albert Eames, Pres., the Bridgeport Horse Railroad Company; B. F. Lashar, Supt., the Bridgeport Horse Railroad Company. Brooklyn, N. Y.: William Richardson, Pres., the Atlantic Avenue Railroad Company; W. J. Richardson, Sec., the Atlantic Avenue Railroad Company; Hon. Benjamin F. Tracy, Director and Counsel, the Atlantic Avenue Railroad Company; Thos. Murphy, Director, the Atlantic Avenue Railroad Company; Charles A. Richardson, Attorney, the Atlantic Avenue Railroad Company; John E. Richardson, M. D., Surgeon, the Atlantic Avenue Railroad Company; William H. Hazzard, Pres., Brooklyn City Railroad Company; William M. Thomas, Vice-Pres., Brooklyn City Railroad Company; William N. Morrison, Supt., Bushwick Railroad; R. J. Morrison, Inspector, Bushwick Railroad; Walter A. Jones, Vice-Pres., the New Williamsburgh and Flatbush Railroad Company; Charles E. Harris, Supt., the New Williamsburgh and Flatbush Railroad Company. Buffalo, N. Y.: Henry M. Watson, Pres., the Buffalo Street-Railroad Company; Samuel S. Spaulding, Sec. and Treas., the Buffalo Street-Railroad Company; Samuel S. Spaulding, Pres., the Buffalo East Side Street-Railway Company; Henry M. Watson, Sec., the Buffalo East Side Street-Railway Company. Cape May City, N. J.: William Wharton, Jr., Pres., the Cape May and Schellinger's Landing Railroad Company. Chicago, Ill.: Charles B. Holmes, Pres., Chicago City Railway Company; Jacob Rehm, Vice-Pres., North Chicago City Railway Company; Augustine W. Wright, Supt., Track and Construction, North Chicago City Railway Company; James K. Lake, Supt., the Chicago West Division Railway. Cincinnati, O.: Albert G. Clark, Director, the Cincinnati Street-Railway Company; Geo. B. Kerper, Pres., the Mount Adams and Eden Park Inclined Railway. Cleveland, O.: Tom L. Johnson, Pres., Brooklyn Street-Railroad Company; A. J. Moxham, Vice-Pres., Brooklyn Street-Railroad Company; M. S. Robison, Jr., Supt., Superior Street-Railway. Columbus, O.: A. D. Rodgers, Pres., Columbus Consolidated Street-Railroad Company. Concord, N. H.: Moses Humphrey, President, Concord Horse Railroad. Dayton, Ky.: W. W. Bean, Pres., Newport and Dayton Street-Railway Company.

Dayton, O.: Charles B. Clegg, Pres., Oakwood Street-Railway Company. Denver, Col.: B. A. Jackson, Vice-Pres., Denver City Railway Company. Detroit, Mich.: Charles M. Dailey, Gen'l Manager, Grand River Street-Railroad Company. Grand Rapids, Mich.: D. Atwood, Gen'l Manager, The Street-Railway Company of Grand Rapids. Hartford, Conn.: E. S. Goodrich, Pres., the Hartford and Wethersfield Horse Railway Company. Indianapolis, Ind.: Tom L. Johnson, Treas. and Manager, Citizens' Street-Railway Company. Jersey City, N. J.: C. B. Thurston, Pres., Jersey City and Bergen Railroad Company; E. F. Brooks, Consulting Engineer, Jersey City and Bergen Railroad Company; James B. Vredenburg, Director and Counsel, Jersey City and Bergen Railroad Company. Louisville, Ky.: B. du Pont, Pres., Central Passenger Railroad Company; H. H. Littell, Supt., Louisville City Railway. Lowell, Mass.: W. E. Livingston, Pres., Lowell Horse Railway Company; J. A. Chase, Supt., Lowell Horse Railway Company. Montreal, Can.: Edward Lusher, Sec. and Treas., the Montreal City Passenger Railway Company; T. H. Robillard, Supt., the Montreal City Passenger Railway Company. New Bedford, Mass.: Warren Ladd, Pres., New Bedford and Fairhaven Railway Company. New York City, N. Y.: J. B. Slawson, Pres., Central Cross-Town Railroad Company; M. I. Masson, Sec., Central Cross-Town Railroad Company; William White, Pres., the Dry Dock, East Broadway and Battery Railroad Company; Elijah Whitney, M. D., Director, Harlem Bridge, Morrisania and Fordham Railway Company; Albert B. Whitney, M, D., Director, Harlem Bridge, Morrisania and Fordham Railway Company; Jacob Sharp, Pres., Twenty-third Street Railway Company. Niagara Falls, N. Y.: Benjamin Flagler, Pres., Niagara Falls and Suspension Bridge Railway Company. Norwalk, Conn.: James W. Hyatt, Pres., Norwalk Horse Railway Company. Pittsburgh, Penn.: John G. Holmes, Pres., Citizens' Passenger Railway Company; W. W. Patrick, Pres., Pittsburgh and Birmingham Passenger Railroad Company; Harvey N. Rowe, Sec., Pittsburgh, Oakland and East Liberty Passenger Railway Company. Providence, R. I.: Jesse Metcalf, Pres., Union Railroad Company; D. F. Longstreet, Vice-Pres. and Gen'l Man'r, Union Railroad Company. Racine, Wis.: Charles Hathaway, Gen'l Manager, Belle City Railway. Richmond, Va.: Channing M. Bolton, Manager, Richmond City Railway; Charles Selden, Supt., Richmond City Railway. Rochester, N. Y.: Patrick Barry, Pres., Rochester City and Brighton Railroad Company; C. C. Woodworth, Sec., Rochester City and Brighton Railroad Company. Springfield, O.: D. W. Stroud, Pres., Citizens' Street-Railroad Company. St. Louis, Mo.: Julius S. Walsh, Pres., Citizens' Railway Company. Troy, N. Y.: William Kemp, Pres., Troy and Lansingburgh Railroad Company; Charles Cleminshaw, Vice-Pres., Troy and Lansingburgh Railroad Company; D. W. Tuthill, Director, Troy and Lansingburgh Railroad Company.

The following gentlemen acquired membership on behalf of their respective roads:

Baltimore, Md.: George P. Frick, Pres., North Baltimore Passenger Railway Company. Brockton, Mass.: Horace B. Rogers, Supt., Brockton Street-Railway Company. Brooklyn, N. Y,: Joshua, Crandall, Supt., Broadway Railroad; Henry Myerholz, Inspector, Broadway Railroad. Cambridge, Mass.: A. L. Richards, Gen'l Manager, Cambridge Railroad Company; John N. Akarman, Supt., Charles River Street-Railway Company. Camden, N. J.: John Hood, Treas. and Supt., Camden Horse Railroad Company. Cincinnati, O.: George A. Smith, Pres., Cincinnati Inclined Plane Railway Company. Cleveland, O.: Charles Hathaway, Supt., West Side Street-Railroad; A. Bartlett, Supt., Woodland Avenue Railway. Dayton, O.: A. W. Anderson, Supt., Dayton Street-Railroad. Easton, Penn.: Henry A. Sage, Pres., Easton and South Easton Passenger Railway Company. Memphis, Tenn.: Raphael Semmes, Supt., Memphis City Railway. New York City, N. Y.: James W. Foshay, Pres., Broadway and Seventh Avenue Railroad Company; G. Hilton Scribner, Pres., Central Park, North and East River Railroad Company; C. Densmore Wyman, Vice-Pres., Central Park, North and East River Railroad Company; William N. A. Harris, Supt., Central Park, North and East River Railroad Company; George Law, Director, Eighth Avenue Railroad Company; John D. Oxner, Pres., Houston, West Street and Pavonia Ferry Railroad Company; Daniel B. Hasbrouck, Sec. and Treas., Houston, West Street and Pavonia Ferry Railroad Company; William S. Thorn, Pres., the Second Avenue Railroad Company; Lewis Lyon, Pres., Third Avenue Railroad Company. Ogden, Utah Ter.: Orson P. Arnold, Vice-Pres. and Supt., Ogden City Railway Company. Peoria, Ill.: H. R. Woodward, Pres., Central City Horse Railway Company. Philadelphia, Pa.: George S. Candy, Sec. and Treas., Frankford and Southwark Passenger Railway Company; John B. Parsons, Pres., the Lombard and South Streets Passenger Railway Company; Thomas W. Ackley, Pres., Thirteenth and Fifteenth Streets Passenger Railway Company. Salem, Mass.: B. W. Russell, Pres., Salem and Danvers Street Railway Company. San Francisco, Cal.: Hon. Drury Melone, Director, City Railroad Company. Salt Lake City, Utah: Orson P. Arnold, Gen'l Manager, Salt Lake City Railway. Savannah, Ga.: George Parsons, Pres., Savannah Coast Line Railroad Company. St. Louis, Mo.: Charles Green, Pres., People's Railway Company. Wheeling, West Va.: C. A. Wingerter, Pres., Citizens' Railway Company; Michael Loftus, Supt., Citizens' Railway Company.

The report of the Executive Committee and the Treasurer's report were then read, showing the Association to be in a prosperous condition.

The proceedings of the Convention were of the greatest interest, and consisted almost wholly in the reading of the various reports of the special committees appointed at the previous Convention, and the discussion thereon. These reports were so voluminous that the entire three days were consumed in their consideration, and the various delegates abandoned the idea of indulging in excursions to points of interest and to sight-seeing generally, until the close of the session.

The first report submitted was that of the Committee on "Track Cleaning and the Removal of Snow and Ice." This report was received, and much discussion followed.

Following came reports of the special committees on "Labor and the Graduated System of Compensation," "The Completed Construction of New Road," "Stables and Care of Horses," "Electricity as a Motive Power," "The Cable System of Motive Power," and "A Uniform System of Accounts," all of which provoked lively and interesting discussion.

At the conclusion of the proceedings the following officers were elected for the ensuing year:

President—Calvin A. Richards, President, Metropolitan Railroad Company, Boston, Mass.; First Vice-president—Julius S. Walsh, President, Citizens' Railway Company, St. Louis, Mo.; Second Vice-president—Henry M. Watson, President, the Buffalo Street-Railroad Company, Buffalo, N. Y.; Third Vice-president—Edward Lusher, Sec. and Treas., the Montreal City Passenger Railway Co., Montreal, Canada; Secretary and Treasurer—William J. Richardson, Secretary, the Atlantic Avenue Railroad Co., Brooklyn, N. Y.; Executive Committee—President, Vice-presidents and William H. Hazzard, Pres., Brooklyn City Railroad Co., Brooklyn, N. Y.; James K. Lake, Supt., Chicago West-Division Railway, Chicago, Ill.; Charles J. Harrah, Pres., the People's Pass. Railway Co., Philadelphia, Pa.; William White, Pres., Dry Dock, East B. & B. R. R. Co., New York, N. Y.; B. du Pont, Pres., Central Passenger Railroad Co., Louisville, Ky.

On Friday evening, October 17th, the annual dinner of the Association was held at Delmonico's. Mr. William White, President of the Dry Dock, East Broadway and Battery R. R. Co., of this city, presided at the dinner, and he was flanked by the newly-elected and retired officers of the Association. The dinner was most elaborate, and was enlivened by toasts and responses from the gentlemen present. The party numbered over one hundred.

The next Convention will be held in St. Louis, Mo., on Wednesday, October 14th, 1885.

Reports of Special Committees.

REPORT OF COMMITTEE ON TRACK CLEANING AND THE REMOVAL OF SNOW AND ICE.

THE AMERICAN STREET-RAILWAY ASSOCIATION :—

Gentlemen—Your Committee for the consideration of "Track-cleaning and the Removal of Snow and Ice: Is Salt necessary? If so, is its Use Detrimental to the Public Health? and Especially, is it Injurious to Horses?" having duly investigated the subject, beg leave to submit the following report:

On the 25th of July, 1884, Mr. William H. Hazzard, President of the American Street-Railway Association, addressed a circular letter to the Presidents and Superintendents of all the street-railways in America, comprising a full series of questions, in relation to the propriety of the use of salt, in the cleaning of the tracks from snow and ice; and whether any better method could be suggested. The inquiry was very explicit, being intended for an exhaustive consideration of the subject; and to afford a criterion for the future policy of street-railway companies. The points to be determined relate to the necessity of the use of salt in the removing of snow and ice from the tracks, and to its healthfulness, both to the public, and to horses driven over the places where it had been employed.

This matter has been a theme of controversy for many years. It is a fact known to every tyro in science, that a mixture of snow, or ice, and salt will produce a temperature so low, as to cause the mercury in the thermometer to fall to zero, F.; and it has been plausibly argued accordingly, that the use of salt to melt the snow and ice upon the tracks of railroads in large towns would result in the withdrawal of caloric from the atmosphere, to an extent that would seriously affect the salubrity of the neighborhood, and render those of the population of a sensitive constitution, more than usually liable to contract dangerous maladies, as colds, pneumonia, pleurisy, scarlatina, diphtheria, etc. These complaints are frequent in Winter, when snow is abundant, and give importance to the conjecture. The usual increase of mortality at such times is a grave matter, and deserves the most careful scrutiny.

It has also been asserted that horses, traveling in the snow where salt has been used, are even greater sufferers. The chilliness created from the slush and melting snow disposes them, it is declared, to painful disorders of the chest, bowels, and nervous system, and induces certain complaints which, before, were hardly known. The feet are said to be specially affected. It is insisted by many that the intense cold produced in the snow in which the animals are driven, speedily benumbs and paralyzes them, and even freezes the hoof, so as often to destroy it entirely. This has been made the occasion for seeking legislative interposition to put an end to the practice of salting the streets. Nor can any man of common humane sentiments object to such a measure, if the alleged injury has occurred, or is likely to occur from this cause. It is of the greatest importance to ascertain the facts, in order to do away with whatever cruelty may be practiced in the case, and to devise any needed remedy which will avert all unnecessary interference with the passenger-transportation of this continent.

The American Street-Railway Association accordingly directed this inquiry, and appointed a Committee to conduct the investigation. Almost every individual addressed has replied, making a vast accumulation of evidence bearing directly on the subject. A synopsis of these answers may be valuable, in the way of enabling intelligent action. It need not, necessarily, be long. The conclusions, however, appear to be decidedly in favor of the free use of salt, even to a greater extent than is anywhere practiced.

In the warmer regions of the continent, little snow ever falls, and there is no incommoding experienced which requires extraordinary measures. There may also be objections when the temperature is lower than zero, as the salt will not then melt the snow or ice, but adds to the difficulty. In Quebec and Ottawa, in the Dominion of Canada, few attempts are made to remove the snow in Winter, but sleighs are put in use instead. The law requires this.

Public opinion somewhat differs in different places. Generally there has been no thought bestowed upon the matter, except by individuals connected with the street-railway companies. In several of the larger cities, there exists a prejudice against the use of salt to remove snow. It appears to have its center in the city of New York, and to radiate in those directions where the sentiment paramount there, is most influential. Mr. Henry Bergh, President of the Society for the Prevention of Cruelty to Animals, is very decidedly opposed to the use of salt in the streets, and his views are largely shared by excellent citizens. The newspapers in several instances have adopted and advocated them. The Board of Health passed an ordinance against the practice, and it has been prohibited under penalty in the new Penal Code. The same sentiment prevails in Brooklyn as in New York; some are in favor and others opposed. A like diversity of opinion exists also in Boston; and the savants and men of culture are divided like others, some contending that the use of salt in the public streets is beneficial, and others asserting the contrary. In Lowell, the objection is very strong, but appears to be steadily diminishing. The most effective argument, however, seems to have been made in New Bedford: "People who own carriages do not like it, because, when the salt comes in contact with varnish, it stains or removes it."

The testimony from other places is equally varied. In Manchester, New Hampshire, the parties are thus set forth: "People that are friendly to horse-railroads do not object to the use of salt; the others do." In Baltimore, the people are represented as opposing it, together with everything else in connection with horse-railroads, except the cheap fare. In Cleveland, Ohio, the opposition appears to be general, but more decidedly among the owners of sleighs. At Toledo, there is a divided sentiment, but a majority, we are told, would not object to its "reasonable use." The only argument offered, however, is "that it is so considered in other cities," *i. e.*, detrimental to the public health when used to remove snow and ice. It is evidently only a reflected public sentiment. The same thing ought, undoubtedly, to be said in other cases.

In Philadelphia, there exists, perhaps, the greatest prejudice, anywhere known on this subject. The Board of Health added its influence; and the feeling thus created has extended to other cities of the State. The Street-Railway Companies are generally prohibited by ordinance from the use of salt on their roads. Mr. John B. Parsons, President of the Lombard and South Streets Passenger Railway Company, explains the cause of the difficulty, as follows: "We had no machinery, such as we now have, and, as a consequence, depended solely upon the use of salt to turn the snow into a slush, so that the cars could be drawn by the horses. No particular attention was paid to keeping open the inlets, so that the slush could run off from street-corners and other natural depressions in the streets. As a consequence, the street-crossings were almost impassable, and much complaint came from the citizens. Many diseases were attributed to its use, and public clamor became so loud that the Councils passed ordinances limiting its use to certain portions of the city, and prohibiting its use in other portions, under a heavy penalty."

Many physicians, however, gave their judgment at the time, that salt was not detrimental, and the general opinion is beginning to change. The public journals of the city are now speaking approvingly of the use of salt, and the companies are beginning to use it again.

There is a strong prejudice against its use in Reading, which is ascribed to the influence of the excitement in Philadelphia; still salt is used, but the fact is not admitted. In Pittsburgh, there has been talk of applying to the Legislature for a prohibitory statute, on the ground that it spoils the fine "finish" on carriage-wheels. Nevertheless, all vehicles seek the railway-track in preference, because it is always open. The only opposition to the use of salt upon which the public seem to agree, is that it benefits a corporation. The majority favor its employment.

In the other parts of the country where street-railways abound and snow is abundant in Winter, public sentiment appears to be generally unanimous in favor of the use of salt, because of the facilities which it gives in clearing away a most formidable obstruction to travel. No other method is known which would be more practical, more economical and more satisfactory. The only thing suggested is a sweeping-machine combining a boiler, to which the snow may be carried and melted. This, it seems, can hardly be feasible, and even though it were, the same objections on the score of slush and detriment to health would exist, and to a much greater extent.

The testimony appears to be unanimous, so far as relates to the entire absence of injury to the animals employed. No precautions are used to protect their health, yet no disease has been observed, which might have been occasioned by the exposure. No special care seems to have been taken of those that traveled in the salt mixture, beyond rubbing them off when taken from the cars to the stables. The inquiries were very explicit; relating to the effect on the nervous system, the general health, the effect on the feet, legs and bellies, the shell or lamina of the feet, and the frog or soft part of the foot; and the answers were unequivocal, that no perceptible injury or hurt had been noticed. One correspondent had noticed "scratches," and another mentioned the possibility of harm from too long exposure. Another, however, was of opinion that the effect of the salt on the animals had been decidedly wholesome in regard to health of limbs and body. Indeed, Messrs. Haller, Beck & Co., of the Union Salt Works, at Allegheny City, declare that during twenty years they have used from 25 to 30 horses, and never had any trouble on account of the salt. They never had a horse afflicted either with thrush or "scratches." Their animals, they consider, are as fine as any in the city. The salt seemed to have been salutary to them. Another advantage was generally noticed. The slipping and straining so common in slippery roadways was far less frequent

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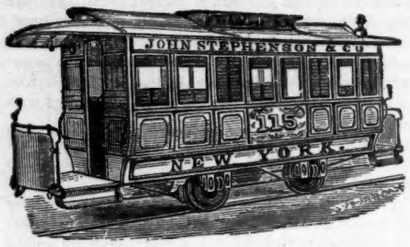

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where the snow and ice had been so removed. Less than half the number of slips and falls were estimated to occur.

No other method known is so cheap or efficient for the purpose. One or two companies use ashes when the coating of ice is thin, but the result is hardly satisfactory. In Philadelphia, the tracks are cleared by scraping, but at large cost. One company in Ohio used a heavy iron scraper, procured in Detroit, to clear the ice from the rails, but it did not give satisfaction. It is for this purpose that the salt is more generally employed. Many companies use it in no other case, but depend on snow-plows and shoveling; but the inference is unavoidable, that if they were prohibited entirely, the street-railways in the northern cities of the Union would be impassable many weeks in each Winter.

Careful examination has also shown that there is no ground whatever for apprehension in regard to the public health from this cause. There has been no epidemic or prevalent disorder set in operation or aggravated anywhere by the use of salt on thoroughfares. The rate of mortality has exhibited no alarming increase, nor does this appear to have been anywhere suspected. All complaint is confined to what *may* occur—some possible or hypothetical result. The slush and pools of water that are liable to be formed at low points in the streets or at the crossings, making pedestrianism unpleasant, and the injury to the paint and varnish on wheeled carriages, constitute all the well-supported ground of complaint. It would not be difficult to obviate these, and it ought to be done. The fault lies, however, with the municipal authorities, who have been remiss in regard to furnishing the proper facilities for drainage.

Observations carefully made with the thermometer show that the mixing of salt with snow in the streets makes no perceptible change of temperature. It is no colder in the thoroughfares where it is done, than in others at a distance. This is the only objection which has a plausible foundation scientifically, and it appears to be utterly fallacious.

In conclusion, therefore, the Committee find that the use of salt for the removal of ice and snow from the railway-track, to be an imperative necessity; and that there exists no reasonable cause for apprehension of injury or detriment to the public health, or to the health and physical comfort of the animals employed. What objections really exist are easily removed, while the advantages are indisputable.

Indeed, it is evident that the weight of evidence, as well as argument, is on the other side. The removal of snow from the streets is a problem that has taxed the ingenuity of public officials in several of our large cities. Hundreds of thousands of dollars have been expended in New York for carting it away to the rivers, and yet it was found impossible to accomplish more than to clear the more public thoroughfares. It would have been a far greater economy, if the City Government had, instead, caused all the streets to be copiously salted during the snow-storms, and taken efficient measures at the same time to drain the brine and slush immediately into the sewers. We trust that this subject will be taken into consideration at an early day.

The public health, so far from being injuriously affected, will be promoted by the free use of salt in such a way. The brine flowing into the sewers will, in a great degree, prevent the decomposition of the various refuse materials which are deposited there from the houses above; and, as a direct result, the formation and disengagement of sewer-gas would be arrested, and its discharge into the living apartments consequently prevented. This alone would be a work of sanitation, of which too great an account can hardly be made.

At the present time, the exhalations from fermenting matter in the streets are an active cause of mischief. The air is poisoned, and many of the population, if not made ill outright, suffer, nevertheless, from depressed nervous conditions, and lowered vitality. The squalor and misery endured by the inmates of tenement-houses and other abodes of poverty may thus be rationally accounted for. If some provision could be made for preventing this decomposition of refuse matter in the streets, the salutary effect upon the public health would be immediately perceivable. The utility of salt for this purpose is apparent. If it could be applied at stated periods during the warm season, these benefits would be assured.

The accumulation of snow and refuse of all kinds, which occurs every Winter in many streets, has been frequently remarked. Every warm day the filthy mixture is thawed and more thoroughly compounded, while its noisome effluvia contaminate the air. This process usually continues till Spring has advanced several weeks, and we are often fortunate if the festering mass is removed before the hot days of Summer. It is easy to see how all this would be prevented, if the authorities would take the matter into their own hands, and instead of limiting, discouraging, and prohibiting the use of salt to clear off snow and ice, would employ it freely both for that purpose and to sweeten the atmosphere. The action taken by Boards of Health in the matter shows rather a conforming to ignorant prejudice, than a proper and intelligent comprehension of the facts. A little scientific knowledge would go far toward the silencing of the clamor.

It is plain enough that the antiseptic virtues of salt are patent above those of many popular disinfectants in the way of purifying the air. The salubrity of New York is largely to be attributed to the saline elements derived by the atmosphere from the salt water that surrounds it on every side. The analogy must hold good in regard to the same agencies artificially supplied in the manner indicated.

The objections, which have been repeatedly offered in various quarters to the use of salt by the street-railway companies, it will be seen, are not tenable. The more abundant use of it for the purposes in question would be fully justified. Instead of the burden and expense falling entirely upon them, as is now the case, the public ought to bear a reasonable proportion. We would all be the gainers by the convenience afforded from the speedy removal of the great mass of snow, and in addition, by the increased salubrity of the atmosphere. It is in every way advantageous, and to this conclusion, the good sense of our people must eventually arrive.

A. B. Whitney, M. D.,
Joab Mulvane,
Wm. Hagenswiler. } *Committee.*

REPORT OF COMMITTEE ON LABOR AND THE GRADUATED SYSTEM OF COMPENSATION.

Gentlemen:—Your committee on "Labor and the Graduated System of Compensation," beg leave to report as follows:

The labor system of street-railway companies has this peculiarity, viz.: it is intimately connected with metropolitan society, and is, consequently, much exposed to disturbing influences; it is also distinguished by the fact, that the entire income of the corporation is collected in small amounts by a numerous set of employés. These features render its regulation a matter of considerable perplexity, and make it all the more important that it should be systematized on simple, practical principles. Street-railways are public carriers running through dense populations, their relations to the public being determined in a large measure by their employés. Hence it is, that at the outset of an inquiry as to the best means of regulating their labor system, arises the obvious necessity for mutual good-will between the companies and the labor they control.

In the acquisition of experience in managing street-railways, and in closely watching the details of their operation, the stronger is our conviction that the best guarantee of the labor employed lies in the fidelity, competency and honesty of the men, rather than in any ingenuity of mechanical checks, or other protective or detective arrangements.

This conclusion may be regarded more as a sentiment than a safe rule of business, and others may question the practical economy of a proposition that savors of sentiment alone, than an enforcement of faithful service by arbitrary methods. From a purely business standpoint, it is true of all forms in which invested capital depends for returns on regular continuous labor, that to awake in the employés an interest in their duties and a personal friendship towards the corporation employing them, is the best basis for permanent profits. The moral average of men is as yet unknown, and wherever a large force is employed, there will always be found a certain percentage of disloyalty, duplicity and dishonesty.

To expect to find in artificial devices a complete substitute for personal honesty or for faithful services willingly rendered is fallacious; and we must look farther and sink deeper.

All appointments to positions should be made from that class which would dignify labor, and avoided from that class, which by habit, training or education are suited to higher avocations; and in no case should any device for safeguard in handling money be used that will blunt moral sensibilities.

The employés of railway corporations cannot properly be classified under the head of "skilled labor" The capital invested and its returns is largely at the mercy of the employés, and in few corporations does loss of money more immediately result from inefficient or wasteful labor, or profit more quickly accrue from intelligent and consientious effort, than in street-car companies. But, nevertheless, the services exacted from conductors, drivers and stablemen are not of such a character as to require an apprenticeship to understand. Any man of average intelligence can discharge the duties, and, although he may not be at first as efficient as an old hand, yet a few days, if he be industrious and attentive, will give all the experience that is really necessary. It is, therefore, unwise for them to represent themselves as skilled workmen, or to allow themselves to fall into the pernicious notion that they are as indispensable to their employers, and as difficult to replace as the craftsmen in specified trades and manufactures. In presenting this view, it is only for the purpose of more forcibly referring to the vital importance of managing and directing the labor system. Unless employés of lines are faithful, energetic and economical, it is impossible to obtain substantial success. The neglect or abuse of stock or the running-gear of cars, the waste of feed, carelessness or insolence towards the public, and indifference or dishonesty in the collection of fares, are all means by which employés can impair the operations and entail losses upon these corporations.

To fully guard all these openings, to establish a system of checks by which fraud or negligence can be detected or prevented, is, we are fully persuaded, almost impossible.

A corporation is an artificial person, existing only in the contemplation of law, but this does not deprive it of a certain individualism; and the employers are governed by a distinctive spirit, that in turn regulates their feeling of the service towards it. Sometimes that spirit is harsh, arbitrary and exacting; sometimes loose and improvident; sometimes strict in the

enforcement of rules, but tempered with justice and moderation. Whatever it may be, the employés know it, and their services take color from it; and it is highly important that they should have a clear and definite understanding of the estimate placed on their labor. They should be taught in the first place, that the management does not regard them as skilled workmen; that a "strike" may interrupt, but can in no way stop operations; that if they were all to resign on the same day the company could go ahead the following, not perhaps satisfactorily, but sufficiently so to maintain business, and that but a short time would suffice to oblierate all effects of the interruption. While insisting upon this general feature respecting labor, the men should be made to feel that, if they are not classified as representing skilled labor, neither are they on the other hand regarded as regular day-laborers; that good judgment, promptitude and experience are fully appreciated; that the managements intend and aim to reward fidelity, and that as long as they are trustworthy, they are sure of their places, and that continued conscientious service will be recognized. Promising these general views, there remains to be noticed what in our opinion are the best means of producing the relations mentioned as most desirable.

It should be a settled principle that discharges as far as possible shall not be capricious or without cause, and that promotions will be made on the basis of length of service and personal merit. The labor system of an ordinary line is not sufficiently varied or extensive to embrace a regular scale of promotions, but the principle should be recognized and established, that the management is influenced by the relative merits of their employés; that there is no favoritism tolerated, and that a fathful and efficient man will not be overlooked or unfairly treated. When the men are educated to understand this, an *esprit du corps* will gradually spring up and a guarantee of good work secured, obtainable in no other way. In enforcing a system of fair promotions and a strictly equitable treatment of labor, much dependence must, necessarily, be placed upon the reports of other officers. It is, therefore, of essential importance that they should be honorable and just men, as well as energetic and vigilant, and that their reports should be reviewed carefully by the chief executive officer, through whose individuality flows the inspiration of management.

A graduated system of compensation, regulated according to length of service and general efficiency, would also, if judiciously introduced, be productive of beneficial results. Such a system could not be created summarily, but by establishing conditions as to the filling of vacancies and fixing a lower rate of pay for new appointees, and the terms upon which their advancement will take place, a complete system may soon be created, the features of which can be adjusted to suit the particular circumstances surrounding the operation of each particular line. A man who possesses experience, and whom the company has tested and found reliable and competent, is certainly worth more wages than a comparatively new appointee. His services are more pecuniarily profitable, and there is a corresponding loss when a new man is placed upon the same footing.

A graduated system of compensation should be based upon a permanent and well-known classification of the men, and by this means there might be, if desirable, a saving of wages and a better recognition of individual merit and demerit. The system once established would tend to promote fidelity and self-respect among the employés; seeing its justice they would coöperate in its maintenance; and at the same time it would improve the relation of capital and labor and give to the men a stronger personal interest in the permanency of their employment.

The use of all kind of registers and other detective arrangements and contrivances simply expresses distrust; all of them represent the same efforts of experience and ingenuity to devise a substitute for personal honesty; all of them are imperfect and irritating, tending to blunt moral sensibilities and foster want of confidence.

It is undoubtedly true that these devices cannot be dispensed with under the conditions that now exist, and the views here expressed have reference rather to general principles of the regulations of labor, than to the details of detective measures; yet we cannot fail to see in their introduction a great disturbing element. We will not, therefore, discuss the relative values of the various contrivances, but insist that were it an established fact that these artificial means were indispensable, yet, even then, the principles herein set forth ought to control the labor system of street-railways. The losses incurred by strikes, from which we have not been exempt, the ceaseless discussion of the relation between labor and capital, incident to modern times; and the increasing sensitiveness of capital to social disquiet, all unmistakably suggest, that, so far as possible, corporations employing large forces of men should ground their policy on equity, and avoid unnecessary antagonisms and consequent hostile legislation. We owe this duty to society, and we owe it to the large interests confided to our charge. It may be impossible to prevent occasional disputes, but when they arise, we should not be found evidently in the wrong, and bear the stigma of oppressing labor, or of neglecting wise and just rules for its employment and control.

We feel assured that the application of principles herein indicated will not increase the expense of operation, and will remove much of the anxiety and difficulty connected with the management of street-railways.

We recommend no sudden and sweeping changes, because the labor system supporting all industrial investments of capital cannot be summarily altered without confusion or loss. It crystalizes in fixed forms with the passage of years; and changes, even for improvement, should be gradually introduced.

In conclusion, we recommend that the principles of management we have briefly outlined, should be steadily held in view in the treatment of labor, and so far as possible incorporated in the practical operation of railway lines. Respectfully submitted,

JULIUS S. WALSH,
JACOB REHM,
HARVEY N. ROWE. } *Committee.*

The following letter was submitted as a part of the report of the committee:

OFFICE OF THE NORTH CHICAGO CITY RAILWAY COMPANY,
CHICAGO, October 10th, 1884.

WM. H. HAZZARD, Esq., President American Street-Railway Association, Brooklyn, N. Y.

Dear Sir—Having been appointed by you as an associate member of the committee on "Labor and the Graduating System of Compensation," (as refers to labor employed by street-railway companies), I beg leave to report the following on the subject:

For several years our company has divided all of its drivers and conductors into four classes or grades, as experienced hands are of more value to the company than those just entering our service. We require every man in our employ to remain for the space of two months in the first class, receiving a compensation of $1.50 per diem. After the expiration of two months he enters the second class or grade, remaining therein for four months, receiving a salary of $1.75 daily for his services. After the expiration of the last-named four months, he advances into the third class or grade, remaining therein six months, and receiving the sum of $2.00 as a daily compensation for his labor. Having thus served our company for the space of twelve months, and having become thoroughly acquainted with the duties to be performed by him, and fully able to discharge them intelligently, the laborer enters the fourth class, and his wages are advanced to $2.25, which is a higher sum than any laboring man can earn.

The graduated system of compensation works well with us here, and makes "strikes" an impossibility. No honest and intelligent laborer will "strike" for higher wages, when he knows that by serving through a regular course, he will attain what he cannot possibly get anywhere else.

Any laboring man who enters our service and has been with us for two months is only too anxious to stay, because his wages will be increased for the coming four months. In short, the longer they stay the better is their pay.

Furthermore, this system furnishes us a reliable and trustworthy set of workmen, because the longer they stay the more efficient they become in the discharge of their several duties. Such a wage system secures to us steady and punctual men, who perform their work more cheerfully because they know that their value is acknowledged by the company, which remunerates them for their services with the highest possible wages.

This system of graduating the wages works well here with us. It works somewhat after the manner of a school of probation. After the men have worked through it, they find it to their interest to remain with us. We have all reason to be satisfied with the system, having by it secured a lot of good, steady and reliable men, who generally stay unless discharged for cause. The average hours per man per day is 11½ hours. I have the honor to be, Your obedient servant,

JACOB REHM,
Vice-president, North Chicago City Railway Co.

REPORT OF COMMITTEE ON COMPLETED CONSTRUCTION OF NEW ROAD.

NEW YORK, October 15th, 1884.

Report of the Committee on "Completed Construction of New Road."

In the construction of street-railways, it is evident that while we must endeavor to get the best roadway for the cars, due regard must be paid to the requirements of the general travel, and to the local laws governing the form of rail and other details; so that we are not at liberty to use the best means to accomplish the end desired. In fact, the matter is often so hampered with municipal regulations that it is impossible to accomplish more than an imperfect and unsatisfactory solution of the question.

The best form of rail for the purposes of the railway company alone is, undoubtedly, the "center-bearing," as the weight of the car-wheel in this case bears directly upon the center of the rail and is transmitted evenly to the center of the stringer, so that the track is in the best position to resist the outward pressure which is constantly tending to widen its gauge, and otherwise injure its condition. The spikes with this form are placed alternately on either side of the head, so that the rail, besides having a better bearing on the timber as above stated, is held down equally on both sides. The car-wheels run more smoothly and with less friction than upon any other form, as there can be no possible contact with any paving stones, and the open space provided on the outside has a tendency to keep the head of the rail free from dirt and grit. This is especially the case during cold weather, when one of the most serious difficulties in operating street-rail-

ways arises from frozen mud, ice or snow getting upon the rails, even when the greatest care is taken to keep the track clear. The center-bearing is the standard street rail now in use in New York City, and it is used to a considerable extent in Brooklyn and a few other places.

In the next form, known as the "slope-back," the bearing is approximately in the center, the head being about three inches wide, and beveled or sloped off on the outer edge, so that, to a certain extent, it gives the advantages above enumerated for the center-bearing rail, but only to a limited degree.

The "side-bearing" pattern, with its many variations, is that which is most generally in use in the United States; not because it is the best, but because it is the best that the railway companies are permitted to put down, as wagon wheels can readily get on the track, and it gives a good wide tramway for general travel. This very fact however, is a great detriment, as the general traffic is invited by its smoothness and other advantages to run upon it. Heavy teams going at a slow rate are constantly in the way of the faster moving cars, and the rails are not only worn out by this travel, but the speed of the cars and the general business of the road interfered with. A very serious objection to all side-bearing forms is that the weight of the cars being entirely on the outer side, that part of the rail wears into the stringer sooner than the other, causing the rail to roll out of level and to widen the gauge of the track. All forms in which the head of the rail is narrower than the tread of the car-wheel should be avoided, as the wearing surface is too little, and in the side-bearing patterns this is especially the case, for unless the head is as wide as the tread the projecting edge of the wheel will be constantly striking against the paving stones outside of the rail when the track is new, or the pavement is relaid. This will only cease when the paving-stones shall have been gradually worn away by the action of the wheels, which is a very objectionable and costly process, or when they shall have been knocked down or otherwise settled below the head of the rail.

Your committee would, therefore, recommend the adoption of the center-bearing form of rail in all cases that it will be allowed by the local authorities, especially where the streets or avenues are wide enough to provide the general travel of the street with a good and sufficient roadway, outside of the space occupied by the railway.

Where the service is heavy, a rail weighing sixty pounds to the yard will be found the most satisfactory and in the end the most economical; but upon roads with lighter travel this is not necessary, though it should always be borne in mind that it is impossible to get satisfactory results when materials of poor quality or insufficient size or weight are used. It is not the first cost that should be regarded altogether, for if the railway is well-built with good and sufficient materials the annual wear and tear will be proportionately reduced, so that the profit and loss account from year to year will not be charged with constant repairs rendered needful by poor or scanty construction at the outset.

The spike-holes should be about twelve inches apart, so that when the rails are first laid it will be enough to spike every alternate hole, thus leaving new holes with their original countersink to be used when the others shall have become worn too large and be unfit to retain the spikes. The rails should be carefully inspected, and any that are not cut square at the ends or not straight and level should be rejected and returned to the mill.

As the gauge of street-railways is almost always established by the local authorities to conform with the legal gauge of the ordinary vehicles of such city, there is in consequence no universal or standard gauge for them. Your committee is, however, of the opinion that from four feet eight inches to five feet two inches gauge, will give the most satisfactory results as a general rule.

Where double tracks are laid, there should be ample space for the cars to pass each other on both the straight tracks and the curves without danger of striking. Five feet between gauge-lines, unless the cars are exceptionally large and wide, will be a sufficient distance; and with straight tracks it will also allow a man to stand between the cars while passing each other, which may prevent many accidents.

All joints of the rails should have rolled iron joint-plates not less than eighteen inches long, placed under them. These should have vertical flanges to fit against the sides of the rails, so as to keep them in line with each other and to increase the vertical strength of the joint-plate itself. If the track is laid in cold weather, the joints of the rails should be kept apart three-eighths of an inch to allow for expansion of the rails in Summer, and this space should be less when the rails are laid, as the temperature rises, although the ends of the rails should never be laid less than one-eighth of an inch apart even in mid-day of the very hottest weather.

The rail-spikes should be five and a half or six inches long, of one-half inch square iron, with countersink heads, to fit into and not project above the countersink in the rail itself. They should be of good, tough iron, so that when driven, the heads will not fly off under the strokes of the hammer.

As street-railways are now usually constructed, the rails are placed upon longitudinal wooden stringers, resting upon transverse wooden cross-ties. Where it can be obtained at a reasonable cost, your committee recommends the use of yellow pine, free from sap-growth, and cut from trees that have not been tapped. As a general rule, the best yellow pine railroad lumber is brought from Georgia or Florida, and in all cities near the seaboard, at least, the rate of freight is low enough to justify its use for stringers and cross-ties. Of course, this may not be so in cities or towns far inland, and in such cases, other lumber must be used which can be more conveniently and reasonably obtained. The ties should be of equal size, in order to give a uniform bearing and support to the track; for if they are of unequal surface, the track will be better held up by the large ties than the smaller ones, thus causing it to be uneven and irregular. For the same reason, they should be placed at a uniform distance apart, five feet from center to center, being probably the most desirable. Uniformity of dimensions can be more certainly had if the ties are sawed than if hewed, and in addition to this the stringers will then always have a good flat bearing upon them. The joints of the stringers should never be under the joints of the rails. The stringers should not be less than seven inches deep, and of the same width as the rail which is to lie upon them, unless it should be one of the narrow forms of rail, in which case the timber should project on both sides not more, however, than one-half inch. It should then be beveled off on the upper edges to the width of the rail before putting down the pavement. The stringers should be, at least, twenty-five feet long, in lengths divisible by five feet, so that there will be no waste in cutting off useless ends to allow the joints of the stringers to come exactly upon the cross-ties. Of course where there is exceptionally heavy service, it may be of advantage to place the ties four feet from center to center, and the size of the ties may then be increased to advantage, say five inches high by seven inches wide, although generally four inches by six inches is large enough. The ties should project outside of the stringers on both sides at least nine inches, and the stringers on the outside should be fastened to the ties by cast-iron knees not less than six inches high and six inches long, and on the inside by similar knees three inches high and three inches long. The long knees on the outside tend to keep the stringer in a perpendicular position and so to preserve the gauge of the track; for tracks never get narrower, all the conditions of their use tending to press them outwards and to widen the gauge. At all joints of stringers, joint-knees should be used on both the inside and outside of the stringers, and they should be broad enough to bear against and be spiked to the contiguous ends of the same, thus keeping them in line. The spikes used for these cast-iron knees should be three and a half or four inches long, and three-eighths of an inch square, with button-heads. The knees should be of good, strong iron, so as not to break easily, in case the workman should miss the spike and accidentally hit the knee itself, and all the spike-holes should be carefully drifted out, so that in driving the knee-spikes, they will not wedge in the holes and split the knee.

It is very important to have the ties and stringers well and solidly tamped-up, and a straight line and even surface carefully obtained. This is a matter which is often slighted, but which should be attended to with great care.

A very troublesome and expensive item of repairs is often caused by the wheels of heavy wagons making ruts alongside of the rails, thus causing the track to get out of gauge, and otherwise wrenching and injuring it. This can be, in a great measure, prevented by putting a row of substantial square-shaped paving-blocks on each side of each rail, which, after being thoroughly rammed, should be left about one-half inch above the rail, otherwise they will settle down so as to be below the rail, when their efficiency will be greatly lessened.

All the undisturbed bed between the cross-ties should be loosened up with the pickaxe, so that all of the pavement shall have the same bearing, and it will settle alike all over.

The best pavement for the horse path is probably had by using cobble-stones about six inches long, about four inches wide and two or three inches thick. These dimensions give stones of moderate size, and of flat, oval form, so that when closely set on end they furnish a very good foothold for the horses, and the pavement can be kept in repair with a very reasonable cost. The horse path should be paved as nearly as possible level, and all crowning or elevation in the middle of the track should be avoided, so as to allow the horses' feet to travel evenly and squarely. The stones should be laid upon a bed of good, sharp gravel or coarse sand six inches deep; they should be thoroughly rammed three times, and left with a covering of the same material about one-half inch deep, from which all stones over an inch long should be raked off.

At proper and frequent intervals, suitable connections should be made with the sewers or with surface drains where sewers are not in use. If this matter is not properly attended to, great inconvenience and expense will be caused, especially in cities where the melting of snow during Winter causes a great accumulation of water upon the track which, if not promptly removed, may, by a sudden change of weather freeze up solid on the track. In any event, no track can be properly kept in order unless the surplus water is promptly and adequately drained off. The general elevation of the whole track should be a little higher than the rest of the street, to aid in draining the water away from the track.

The radius of the curves will be governed by the width of the streets and other conditions, but it is always desirable to avoid curves of small radius. A curve of fifty or sixty feet radius is probably the most desirable when it can be laid down, but in many cities the width of the streets will not per-

mit curves of more than thirty or thirty-five feet radius, which, however, if properly laid, will give all reasonable satisfaction. The curved rails should be of the grooved form on both the inside and outside lines of the curve, although in curves of large radius it is not necessary to have the outer line laid with grooved rail; in such cases bending the rail used upon the rest of the track to proper shape. The groove should be about one and a half inches wide, and the inner side or guard of the grooved rail should not be more than three-eighths of an inch above the tread. Great care should be taken in laying the curves to have them of regular curvature, uniform gauge, and with no abrupt changes of surface. Ordinarily, a curve laid with the inner and outer rails on the same level will give the best results in service, but there are instances when, from the grade of the streets it will be found necessary to elevate one rail higher than the other. The outer rail may then be elevated a few inches above the inner without any disadvantage, and possibly in some cases to advantage; but the inner rail should never be higher than the outer if it can possibly be avoided, although a slight difference in this respect, where absolutely unavoidable, can be allowed, if the curve is very carefully and accurately laid down. The curves should always be so constructed and laid down that all four wheels of the car will bear equally upon the rails; as otherwise, if any one of the wheels should have its portion of the load removed from it by reason of a depression in the track, it will have a tendency to run off the curve at that point. The curved rails should be, when practicable, in lengths of thirty feet, so as to have as few joints as possible, and a straight guard-rail not less than seven feet long should be attached to each end of the inner line of the curve.

On single-track railways where it is necessary to have turnouts or passing places, they should be so constructed as to allow the cars to run easily into and out of the turnout. This can be accomplished by making the curves leading into and out of the turnouts of large radius, say three hundred or three hundred and fifty feet. As, however, in cities the length required for this form of turnout is often inadmissible, it will then be necessary to use curves of shorter radius, and a turnout with grooved rails of seventy-five feet radius will probably be found the most desirable under such circumstances. Where the curved rails of the turnout are of three hundred or three hundred and fifty feet radius it will not be necessary to use any grooved rails, as the ordinary rails when carefuily curved, will be sufficient to guide the car wheels.

The castings for all switches, frogs, and crossings should be made from hard, tough iron, and of substantial size and weight. At each end of the casting there should be a recess or pocket of the right size and shape to support and retain in position the end of the adjoining rail; or, when two castings themselves abut together, the end on to which the cars run should rest in a pocket formed in the end of the other casting. Particular care should be taken to have all castings evenly and solidly bedded upon the timber supporting them, for otherwise they are liable to be broken by the shocks and strains of heavy loads crossing over them. At places where frogs or crossings are required and one of the tracks is used very much less than the other, it will often be found desirable to have the castings so made, as to allow a continuous rail to run through a recess in the casting, thus giving an unbroken rail to that one of the tracks which has much the greater travel, while the occasional cars running on the other track have their wheels so raised up that their flanges pass readily over the top of the continuous rail. "Toe-pieces," or slight projections, should be made on all castings, when, by the size or smoothness of the surfaces exposed, horses are otherwise liable to slip upon them, smooth spaces being left only where the car-wheels run.

The use of turn-tables should, wherever it is possible, be avoided, but as they will often be found necessary, it is important that those only should be used which will turn easily, present little or no obstruction in the street, and require but a reasonable amount of repairs when in use. They should be set on brick or stone foundations laid below the frost-line, and they should be thoroughly provided with drainage.

Within a recent period, and especially within the last five years, a very radical change has taken place in the manufacture of rails, whether for steam or horse-railroads; the material now used in the construction or repair of railways being almost universally steel instead of iron; in fact it is now very difficult to get iron rails, as the mills that formerly made them have mostly gone out of the business, or have changed their plant to make steel rails instead. The improvements in the manufacture of steel have been so great that there is now no inducement to use the inferior article, as the superior can be had at the same or a less price. The service of steel rails on an average street-railway is, probably, at least three times that of iron rails of equal size and weight, the wear of the steel rails being also more even and regular. One great cause of the rapid deterioration of iron rails furnished for street-railway use, arose from the fact that they would laminate and often split off in pieces of considerable size, so that the surfaces were not only worn away, but actually broken away and splintered off. Steel rails, on the contrary, being of homogeneous and tough material, are not subject to this objection, every particle that is worn off under service coming away by itself, but not dragging with it any other portion of the mass.

Before closing, we must not omit to refer to the various forms of girder-rails introduced within the last few years to a considerable extent, by which wooden stringers are altogether avoided. One great advantage that they give is that a perfectly secure and level joint can be had at the ends of the rails, as fish-plate joints can be used, similar in general character to those in use on steam-railroads. The deterioration of the roadway by reason of the decay and wearing away of the stringers under the rails is avoided, as no timber is used with them, excepting for cross-ties, and these are so far underground as to last a very much longer time than the stringers would last, not being exposed as they are to the constant changes of temperature and of moisture and dryness. It is quite possible that the standard street-railway of the near future will be constructed with steel girder rails set on iron or steel cross-ties, and held to gauge by iron tie-rods.

No reference is made in this report to the construction of cable-railways, as that whole subject is comparatively new, and no special system of construction for such railways can as yet be regarded as being proved to be the most desirable one.

WM. WHARTON, JR., *Chairman of Committee*,
President of Cape May and Schellenger's Landing R. R. Co.,
Cape May, N. J.

NEW YORK, October 15, 1884.

(The remaining reports of Special Committees will appear in the next issue of the JOURNAL.)

An Improvement for Cable Roads.

ACCORDING to the San Francisco *Call*, a mechanical engineer of that city has invented and patented a plan for dispensing with the necessity of depressions in the street grades at points where cable roads intersect each other. At present when a car is approaching the crossing of another cable road the man in charge of the dummy that is drawn by the under cable has to let it go some distance before he arrives at the crossing, and take it up again at the same distance on the other side. As this distance is too great for the car and dummy to be carried by their own momentum, a depression in the grade has been made to accelerate their movement after the cable is dropped sufficiently to carry them to the point beyond where it is to be picked up again. The invention referred to enables the man at the grip to hold on to the cable until his car is so near the intersecting road that its momentum will carry it to where the grip can seize its hold again without interfering at all with the grade of the street.

STREET-RAILWAY NOTES.

THE Kansas City Cable Railroad will open for business next month. It is 1¼ miles long, connecting the business center of the city with the summit of the bluffs and saving travelers from twenty to thirty minutes of travel. The road was begun a little over a year ago, and has cost about $300,000. A majority of the stock is owned in Boston, where it is valued at $112 per share. The promoters expect it to prove a profitable investment.

THE St. Paul & Minneapolis Elevated Railway Company directors have elected the following officers: President, J. H. Drake; vice-president, J. B. Bassett; secretary, O. F. Sherwood; treasurer, Albert Shaeffer.

IN the department of New Inventions of the JOURNAL this month, is published the description of a safety car-gate designed for use on street-cars.

BERLIN oculists report that the iron dust floating from elevated railways in streets has added five per cent. to the profits of the profession.

THE Rome Street-Railway Company, of Rome, Ga., will soon commence building their road.

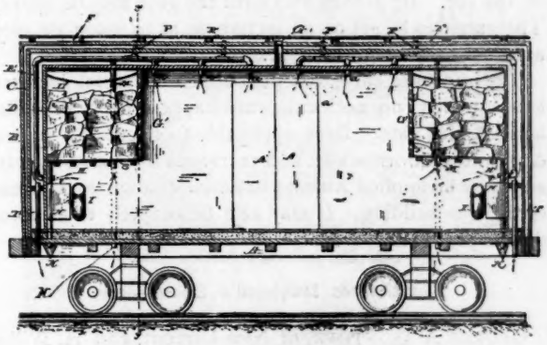
A SYSTEM of "penny fares" has recently been intoduced upon the street-railways of Dublin, Ireland.

New Inventions.

Baumgardner's Refrigerator-car.

NEWTON L. BAUMGARDNER, of Wooster, O., has invented a refrigerator-car, which is herewith illustrated and described. It is claimed by the inventor that heretofore in the construction of such cars, warm and vitiated air accumulates at the top of the packing department, thus causing loss of cargo; and, that upon the principle that cold air is heavier than hot, he obviates the difficulty of uneven temperature by an arrangement of cold air circulating pipes.

The design of the car is to convey perishable cargo by railway, and to keep it in a fresh, preserved state while in transit and at stoppage points along the route, and to economize in the consumption of ice.



BAUMGARDNER'S REFRIGERATOR-CAR.

The accompanying cut shows a longitudinal interior view of the car. The object of the invention is accomplished by the combination of the pipes E, which conduct the cooled air as it is discharged from the ice-boxes by means of the pipes M, up the ends and along the top of the car where it is discharged into the car by the pipes *a a*, whence it circulates and descends among the cargo. At the same time fresh outer atmosphere is admitted into the bottom of the car through the lower ports of the pipes M, the vitiated air passing up the pipes G, and discharging at the pipes *p' p'*, in the channel F, formed by the running-board. By the escape of the vitiated air through the flap-valve pipes G, and the fresh air entering at the pipes M, to take its place, a circulation of cold air from the ice-boxes is induced through the pipes E.

Again, to aid this circulation of cooled and fresh air, air-agitators are furnished, consisting of an encased fan-blower I, which admits air at the center of the casing at a shaft on which a blower-wheel is rigidly fastened. The running of the wheel forces the air out of the rim of the casing through a pipe into the car. The blower-wheel, or fan, is to be operated at intervals, or continuously, by means of an automatic mechanical device placed in the box N. The fan can be worked when the car is at rest to great advantage.

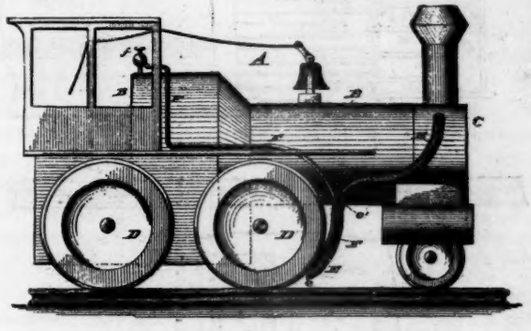
The ice-boxes are composed of a perforated side G, and a solid flooring S, and are drained by the pipe H, into a subjacent trough K. The ice-boxes are accessible through doors in the sides of the car. They are provided with a perforated partition in their upper portion.

The floor, or bottom of the car is composed of two layers of planking separated by a non-conducting filling, preferably charcoal. The outer body B, and the inner partitions C and D, are mounted upon the bottom A. No communication exists between the space included between the car-body and the partition C, and the external atmosphere or the interior of the car, the space being a non-conducting dead-air space. The car-body is surmounted by a three-sided channel F, open at both ends, from which pipes *p p*, enter the space between the walls C and D. The pipe T, supplies outer atmosphere to the dead-air space.

By this combination the inventor claims that he has produced a refrigerator-car complete in all the parts desired for the purposes for which it is intended, and that by it a minimum quantity of ice is consumed and a greater amount of perishable cargo will be preserved than by other cars for a similar purpose. He also claims that his combination can be applied to refrigerator-buildings with the same success.

Johnson's Improvement in Locomotives.

MADISON L. JOHNSON, of Galena, Ill., has invented an improvement in the construction of locomotives which is illustrated in the accompanying cut. The object of the invention is to prevent locomotive driving-wheels from slipping or spinning.



JOHNSON'S IMPROVEMENT IN LOCOMOTIVES.

The cut gives a side view of the locomotive with the improvement attachment. A represents a locomotive-engine, of which B is the boiler, C the smoke-box, and D D the driving-wheels. E is a pipe which is inserted in the upper or other proper part of the smoke-box C, and, running to the rear, curves outward and downward to the vicinity of the lower part of the driving-wheel D. The exit *e* of this pipe is so constructed and placed in regard to the wheel that when the blast is in operation the particles of smoke and other matters from the smoke-box are driven out of the exit and forced against the surface of the tire, whence they are deflected between the tire and the rail. *e'* is a proper bend in the pipe E, for the insertion of the steam-pipe. F is the steam-pipe, rising from the dome or other proper part of the boiler B, and controlled by the valve *f*. The pipe F runs forward, and, curving outward and downward, enters the smoke-pipe at the bend *e'*, where, in conjunction with the pipe, it forms a blower, being of much less diameter than the pipe E.

The operation of the apparatus is as follows: When the wheels are found to be slipping, the engineer opens the

valve *f*, admitting a jet of steam into the pipe E. Then, of course, the particles of smoke and other matters are drawn from the smoke-box C and forced upon the tires and between the tires and the rails.

In employing this improved device the use of sand is obviated.

Hughes's Improved Car-gate.

DR. CHARLES H. HUGHES, of St. Louis, Mo., is the inventor of a new and improved car-gate, the object of which is to provide a simple, safe and effective gate for railway and street-cars, the platforms of railway stations, and for other similar purposes, especially for window-guards. The invention consists in a series of bars forming the gate, and, in combination therewith, of a series of tubes inserted in the car-wall and adapted to receive the bars, each bar being provided with a roller on its free end to run on the inner surface of the pipe.

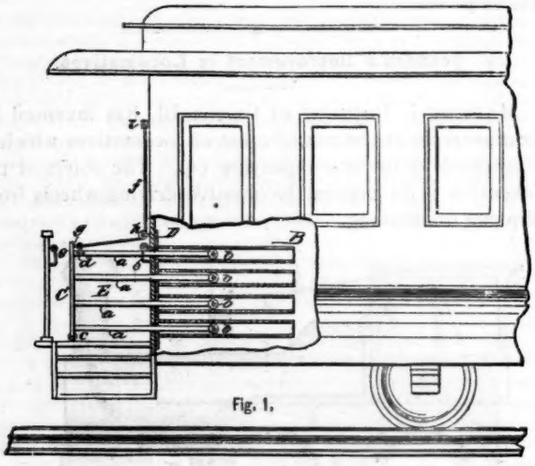


Fig. 1.

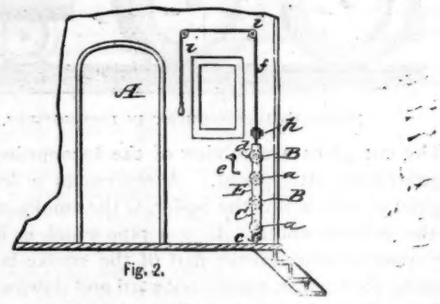


Fig. 2.

HUGHES'S IMPROVED CAR-GATE.

The accompanying cuts illustrate the device and its operation. Fig. 1 is a side elevation, partly in section, of a part of a car with the improved gate applied, and Fig. 2 an end elevation. The reference lettering is similar in the two cuts.

In the side wall of the car A is inserted a series of tubes B, which are preferably screwed into a plate D; but they may be inserted in the car-wall separately. The openings in the plate D are made smaller in diameter than the tubes B, to prevent the gate-bars from being drawn out of the tubes. A gate E, composed of the bars *a*, projecting through the end wall of the car into the tubes B, and secured at their outer ends to a vertical bar C, is capable of sliding in or out over the car-platform. The ends of the bars *a* within the tubes B are provided with rollers *b*, or with semicircular or circular heads, to steady them in the tubes, and the vertical bar C is provided at its lower end with a roller *c*, which rests upon the car-platform and supports the outer end of the gate. The openings in the plate D, through which the bars *a* slide, are made smaller in diameter than the tubes B, to prevent the rollers or knobs at the end of the gate-bars from being drawn out of the tubes. When the gate is closed, the bars *a* are partly withdrawn from the tubes B, and when it is opened the bars are pushed into the tubes. The gate is provided with an eye *d*, which is capable of being engaged by either of the hooks *e*, attached to the end of the car and to the platform-rail, to hold the gate in either an open or closed position. A cord *f*, secured to an eye *g*, in the upper end of the bar C, extends under a pulley *h*, attached to the side of the car and over pulleys *i*, which bring it within easy reach of the conductor or other person near the door of the car. By pulling this cord the gate may be opened. The gate can be set on an incline, so as to open or close automatically by gravitation.

The improved car-gate will not open by lateral pressure; consequently no accidents can happen from crowding against the gate. It is applicable to street and railway cars, and platform-exits, and entrances from and to cars, and may be applied without material change in the cars or in the building. It may also be adapted to elevator-doorways.

Gunther & Hubbard's Snow-plow.

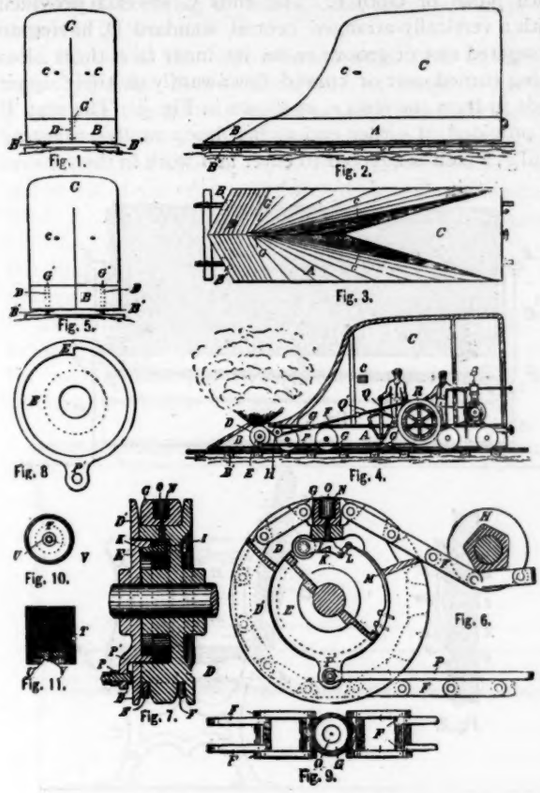
GEORGE A. GUNTHER, of New Utrecht, and H. Wilber Hubbard, of Brooklyn, N. Y., are the inventors and patentees of a new and improved railway snow-plow, which accomplishes its object by the use of explosives in front of the plow, thus loosening and scattering the snow. It consists mainly, in a snow-plow provided with a chain having receptacles for the insertion of torpedoes or cartridges, which are exploded by an automatically-operating hammer.

The accompanying drawings illustrate the device and its operations, the reference-lettering being similar throughout. Fig. 1 is a front view of the improved snow-plow; Fig. 2 is a side view of the same; Fig. 3, a plan view; Fig. 4, a longitudinal sectional view; Fig. 5, a front view of a modification; Fig. 6, an enlarged side view of the wheel over which the chain carrying the torpedoes passes, and of the chain, parts being shown in section; Fig. 7, a cross-sectional view of the pulley; Fig. 8, a side view of the eccentric or cam-disk for operating the firing mechanism; Fig. 9, a plan of the mortar and part of the torpedo-carrying chain; Fig. 10, a plan view of the cartridge, and Fig. 11, a cross-sectional view of the same.

A is a flat car, low and strongly built, and on the front end of it a pilot-plow B, is fastened, which is provided on its bottom with a chilled plate B′, above each rail, so that in case the snow is packed and forces the pilot-plow downward, the chilled plates B′ will be forced on the rails until the load on the pilot-plow is removed. The chilled plates slide on the track when the pilot-plow is weighted, and do not wear off as rapidly as if made of ordinary iron.

On the car A the snow-plow proper is built, very heavily and strongly, of iron plates, and is provided near its

front end with a longitudinal slot G′, below which the firing-wheel D is journaled, which firing-wheel is provided with teeth, like a cog-wheel or a sprocket-wheel, for receiving the links of the chain F, and with a single recess for receiving the mortars G, which are members of an end-



GUNTHER & HUBBARD'S SNOW-PLOW.

less link-chain F, the mortars being arranged the length of the periphery of the wheel D apart, so that for every revolution of the wheel D one mortar will enter the recess formed for receiving them in the rim of the wheel. The endless chain F also passes over a sprocket-wheel R, located further back in the plow C, and mounted on the same shaft with a pulley over which a belt passes, which also passes over a driving-pulley of a steam-engine S, in the rear part of the plow, whereby the wheels R and D can be revolved by the engine.

The mortars G are each provided with a cavity O, adapted to receive cartridges or torpedoes T, and in the bottom each mortar is provided with an aperture for receiving a firing-pin N, projecting loosely through the bottom of a recess in the wheel D, the lower end of the pin resting on a lever or hammer I, pivoted at one end to the wheel D, and having its other end coupled by a link L, with the free end of a spring M, having its opposite end also fixed to the wheel D, whereby the firing-pin N will be pressed in the direction toward the periphery of the wheel D.

The hammer I is provided with a laterally-projecting finger K, which projects under the laterally-projecting cam-rim of a cam-disk E, loosely mounted on the shaft of the wheel D, adjoining the wheel. The cam-rim or track of the disk E is provided with an eccentric inner surface having a shoulder or projection E′. Diametrically opposite the projection E′, the disk E is provided with an arm P′, which is pivoted to one end of a rod P, the opposite end of which is pivoted to a downwardly-projecting lever Q, provided with a locking-lever for locking it in the desired position on a notched quadrant Q′.

The endless chain passes under a depressing-wheel H, a short distance from the inner end of the slot G, to admit of firing at an angle to the rear. If desired, two firing-wheels D can be provided, and in that case the plow must be provided with two slots G′, as shown in Fig. 5. The snow-plow C is provided with small bull's-eye windows *c*, to admit of the operator seeing ahead.

The cartridge T is constructed with a shell of paper or metal, and provided at one end with a flanged head, on the under side of which a cast-iron plate U, is held, which is provided with a vertically-apertured boss or hub. The boss projects through a hole in the head, but is not flush with the end of the cartridge. A piece of paper, etc., is pasted on the inner surface of the plate U, to prevent the powder from passing out of the shell through the aperture in the boss. The fulminate or cap V is placed into the hole in the boss before the cartridge is inserted within the mortar. The cartridge can be capped at the time of manufacture, thus making it fixed ammunition.

The operation of the plow is as follows: The cartridges T are placed into the mortars G, with the cap V at the bottom of the mortars, while the mortars are passing the top of the wheel R; and when the cartridges are to be fired the wheel R is revolved by the engine. The wheel D revolves, but the disk E does not, and as the finger K of the hammer I rests on the cam-track of the disk E the hammer will gradually be pressed downward—that is, toward the shaft—until its finger K arrives at the shoulder or projection E, and when the finger passes this shoulder or projection E the spring M, which has been brought in tension, suddenly snaps or forces the hammer I upward, thereby driving the firing-pin N upward and causing it to strike the cap or fulminate V, thereby igniting the explosive material in the cartridge and exploding the cartridge or torpedo. The force of the explosion exerts itself upward and through the slot G′, thereby loosening and scattering the snow in front of the plow, thus enabling the plow to be pushed forward.

As shown in the drawings, the disk E is so adjusted that the cartridges will be exploded when directly above the shaft. By means of the rod P and the lever Q the disk E can be adjusted so that the cartridges will be exploded near one end or the other of the slot G′—that is, the transverse axis passing through the middle of the hammer—and the arm P of the disk E can be inclined more or less either toward the front or rear, and this causes the hammer to be in advance of or beyond the vertical line through the shaft, and thus the cartridge will be exploded before or after it is vertically above the shaft. The direction of the force of the explosion can thus be adjusted as may be desired.

Pitkin's Car-truck.

ALBERT J. PITKIN, Superintendent of the Schenectady Locomotive Works, Schenectady, N. Y., has invented an improved car-truck, the object of which is to improve the construction of the body of the truck by reducing its weight without impairing its strength; and the invention

consists, primarily, in an improved organization for accomplishing this result. The improved trucks thus simplified in structure and organization contain not only less material, and are therefore much lighter than the ordinary truck, but also can be built with greater facility.

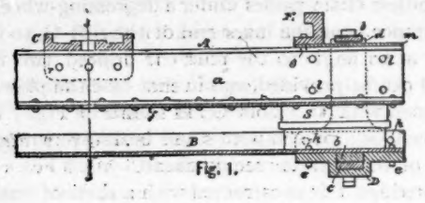
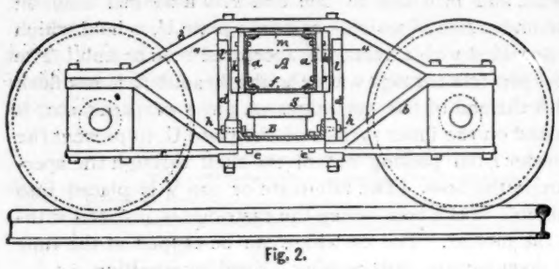


Fig. 1.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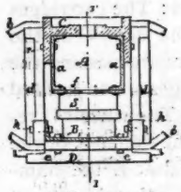
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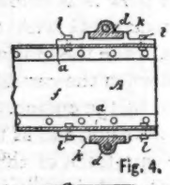
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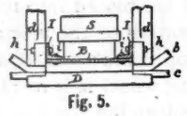


Fig. 5.

Fig. 6.

PITKIN'S CAR-TRUCK.

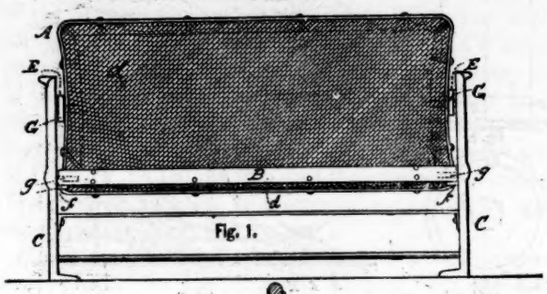
In the accompanying illustrations, Fig. 1 is a longitudinal section on the line 1 1 of Fig. 3 through one end or side of a truck-body; Fig. 2 is an end view, partly in section, showing the trusses and the carrying-wheels; Fig. 3 is a section on the line 3 3 of Fig. 1; Fig. 4 is a section on the line 4 4 of Fig. 2; Fig. 5 is a detail view showing a somewhat modified construction of the channel-plate, and Fig. 6 is a detail view showing a modified arrangement of floating bolster. The reference lettering is similar throughout the illustrations.

The arch-bars *b b* and the tie-bar *c*, which embrace the transom-columns *d d*, are of the usual construction. The transom-columns *d d* are, however, preferably wider than those usually employed, especially at their lower ends, where they are extended on each side, as indicated by the dotted lines in Fig. 1.

Johnson's Car-seat.

THE accompanying cuts illustrate an improvement in railway car-seats recently devised and patented by Alvin P. Johnson, of East Boston, Mass. The invention relates more especially to the upholstery of the seat and the means for changing the same. Fig. 1 is a front elevation of the seat, Fig. 2 a sectional view showing the method of securing the back, and Fig. 3 an end elevation showing the seat and back in transverse section. The same system of lettering is employed throughout.

A represents the back and B the bottom of the seat or seat proper, these parts being respectively upholstered on one side with cane or rattan *d*, and on the opposite side with plush or cloth *v*. The ends C are each provided with a vertically-arranged central standard D, having an elongated slot or groove *m*, on its inner face, these slots being turned over or curved downwardly at their upper ends to form the rests *r*, as shown in Fig. 3. The seat B is provided at either end with a horizontally-projecting stud *g*, which is adapted to enter and work in the grooves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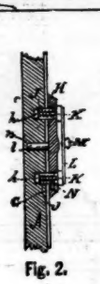
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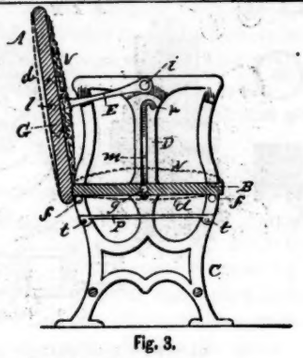


Fig. 3.

JOHNSON'S CAR-SEAT.

m of the standards D; and projecting inwardly from each of the ends C are two studs or lugs *f*, on which the seat B rests when in position for use. The back A is provided with arms E, which are pivoted at one end to the ends C, in the usual manner, as shown at *i*. The outer ends of these arms are each provided with a T-plate G, and an inwardly-projecting stud *l*, on which the back A is journaled, these studs being fitted to work in sockets *n*. A socket H, is formed on the inner face of the plate G, near either end, corresponding sockets J, being formed in the ends of the back A. A bolt K, passes horizontally through the plate G at each of its ends, and is fitted to work in the sockets J H. These bolts are respectively provided with shoulders *h* and springs N, the springs acting expansively against the shoulders and outer ends of the sockets H, to force the bolts into the sockets J and prevent the back A from revolving on the studs or journals *l*. The outer ends of the bolts K are connected by a bar L, provided with the knob M for withdrawing both bolts simultaneously from the sockets J. A guard P, is disposed beneath the bottom B and supported on the lugs *t*. This guard consists of a wide board arranged horizontally and extending the entire length of the seat between the ends C, its object being to protect the upholstery of the bottom from being injured by the feet of the passengers in the adjoining seat at the rear.

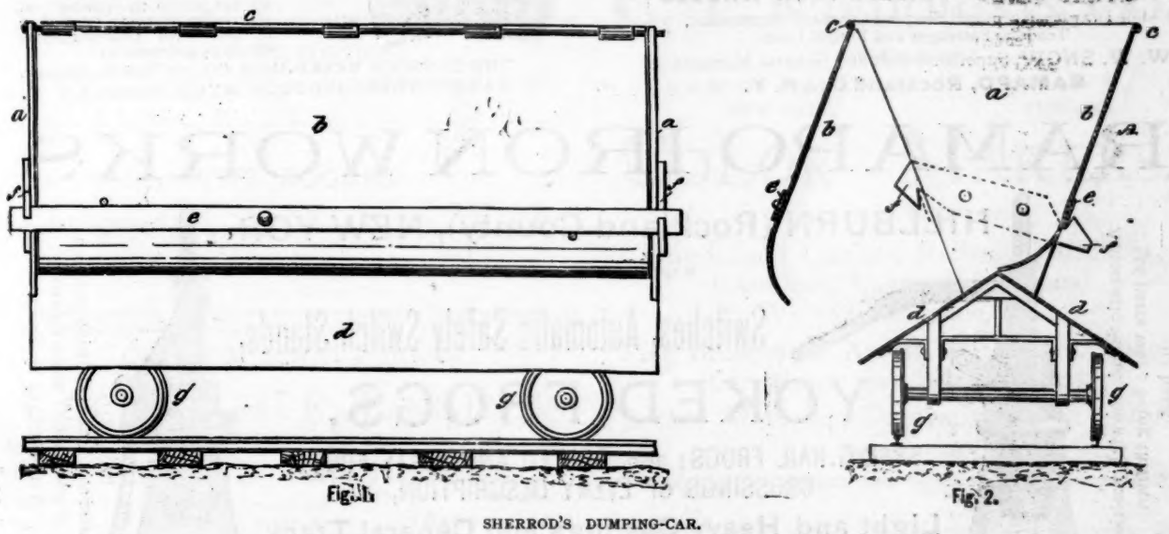
The principal object of the invention is to enable the seat to be readily changed or converted from a Summer to a Winter seat, and *vice versa*, as occasion requires, an upholstery or covering of plush and similar warm materials not being desirable for Summer use, while, on the contrary, a covering of rattan, cane, rawhide, etc., is not desirable in Winter.

In the use of the improvement, when it is desired to turn the bottom B, it is raised until its studs or journals *g* fall into the rests *r* in the upper ends of the slots *m*, when it may be easily revolved until the plush or cane side is brought uppermost, as required, after which it is raised out of the rests and lowered upon the supporting-studs *f*. The bolts K are then withdrawn from the sockets J by means of the connecting-bar L and knob M, and the back A revolved or turned to correspond with the bottom B, or so as to bring its plush or cane-covered side to the front, as required. The slot *m* is extended slightly below the studs *f*, so that when the bottom is in position for use it will not rest on the studs *g* and thereby have a tendency to rock or vibrate.

receptacle with a rounded bottom; or the same result may be obtained by using straight sides, closing together to form a V.

Beneath the body A, and fixed to the frame-work, are slide-boards *d*, placed to form a double incline, the apex of which is at the center, where the sides *b* come together, and these inclines extend out far enough to carry the material beyond the wheels and track. For retaining the sides *b* closed they are provided with pivoted bars *e*, that engage notched pieces *f*, attached on the ends of the car. By this construction and arrangement either door or side can be opened for releasing the load, and the entire load will be discharged when the one door is opened at either side, which is often a great convenience, and if it is desired to divide the load, both sides can be released simultaneously. The shape of the body is such that the pressure on the sides will throw them open as soon as the latches are released.

The dumping-car is preferably constructed of boiler-iron, but it may be constructed of other material, and the device for fastening the hinged sides may also be modified. The invention is applicable to any dumping-vehicle as well as to railway cars.



SHERROD'S DUMPING-CAR.

Sherrod's Dumping-car.

BENJAMIN W. SHERROD, of Birmingham, Ala., has invented a new and improved dumping-car which is herewith illustrated and described. The object of the invention is to furnish a car for carrying coal, coke, gravel, and other material, so constructed as to permit the dumping of the entire load at either side; and it consists in a car made with a body in V form, the inclined sides being hinged at the top and meeting at the bottom above double-inclined slide-boards.

In the accompanying illustrations, Fig. 1 is a side elevation of the dumping-car, and Fig. 2 a transverse sectional view of the same. The reference-lettering is similar in the two figures.

The car is mounted on wheels *g*, which support the body by suitable frame-work. The body A is composed of ends *a a* and sides *b b*, which are hinged at their upper edges to side-rods *c*, that connect the ends *a*. The lower edges of the sides or doors *b* are curved inward, so that they unite when both are closed, thereby forming a tight

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MESSRS. BRADLEE & CO., chain-makers of Philadelphia, have recently had the Chain Testing Machine tested and approved by the British Lloyds. This machine was built several years ago at the Philadelphia Scale and Testing Machine Works, Riehlé Bros., proprietors. The Messrs. Riehlé have recently furnished another large chain works with one of their improved chain testers of 100 tons capacity, and have also constructed a cement tester for the United States government at Washington, this make of machine being preferred to all others that were offered. The Board of Public Works of New York City, have adopted the Riehlé Cement Tester as the standard.

THE Norwegians have gained credit for setting to Europe the example of having ice-water in the compartments of their railway-cars. In England that extraordinary luxury can still be only obtained at certain stations along the line at a penny a glass.

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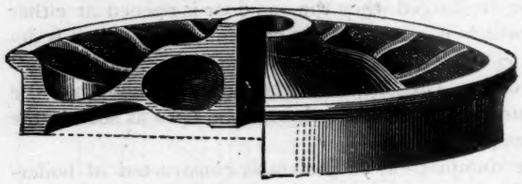

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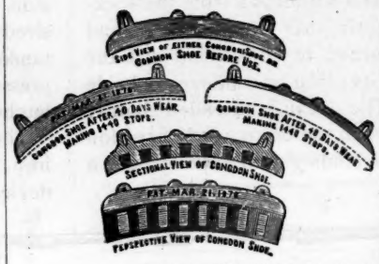

This improvement consists of a brake-shoe having imbedded in its body of cast iron, pieces of wrought iron, steel, malleable iron, or other suitable metal, and while being more effective, in that greater uniformity of friction is obtained when applied, exceeds in life, or the duration of the shoe itself, that of the cast-iron shoe by over *seventy-five* per cent. Its extensive use on many of the most prominent roads in the country has proven its economy and superiority over any other shoe in use. All communications should be addressed to
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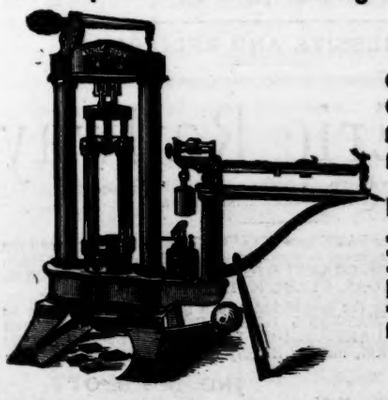

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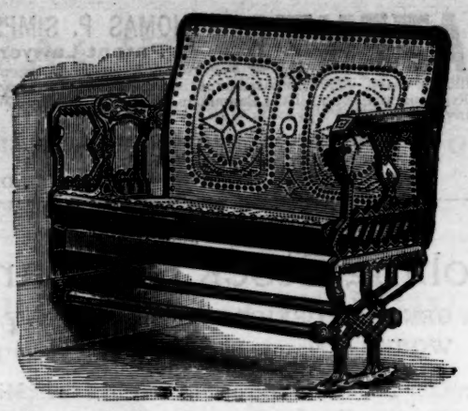

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